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Original Communications

A STUDY OF PNEUMONIA IN THE STILLBORN AND NEWBORN*

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NEW YORK

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UNQUESTIONABLY, if autopsies on the newborn are conducted with as much care and thoroughness as is customary in the examination of adult bodies, the number of unexplained deaths, after due consideration of clinical histories, can be reduced to a very small figure. Improved methods in the technic of performing autopsies have recently done much to emphasize the frequency and nature of intracranial and spinal birth injuries. Another section of pathology of the newborn which awaits full recognition of its importance, and a realization by the obstetrician of the significance of the findings in relation to the management of childbirth, includes the various lesions of the respiratory tract.

Recently we have reviewed all the cases showing evidence of pneumonia, and other pulmonary lesions, in the records of autopsies at the Sloane Hospital during the past five years. The present paper includes a brief summary of the findings and conclusions, together with details of our work on certain types of lesions to which we have devoted special study.

Although a moderate number of cases of pneumonia in stillborn and newly born infants have been recorded in the literature from time to time, especially those showing heavy infections, there have been but few studies of extended series of cases. Hess Thaysen[1], to whose

*Read by invitation before the New York Obstetrical Society, November 11, 1924.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

paper reference may be made for a bibliography of earlier cases, in 1924 reported finding a high percentage among the autopsies on infants dying during the first three days after birth. In his first group of forty-nine autopsies, from 1901 to 1910, about 8 per cent showed pneumonia, but in a second group of thirty-two babies, autopsied during 1910 and 1911, after he began to pay particular attention to the subject, he found pneumonia in 42 per cent. Hess Thaysen classified the modes of infection leading to pneumonia in the newborn as follows:

1. Infection from the mother through the placenta—"diaplacental" infection.
2. Aspiration pneumonia, including aspiration of (*a*) contents of a pathologically infected uterus or vagina; (*b*) secretion of a normal birth canal; (*c*) food or secretions in the nose or mouth of the baby, aspirated after birth.
3. Aerogenous infection, after birth.
4. Metastatic pneumonia, as from a primary infection of the navel or intestine.

Hess Thaysen attributed most of the infections in his series to aspiration of virulent organisms from the birth canals of apparently normal mothers. He did not believe that the pneumonia began *in utero*, from aspiration of infected amniotic fluid; but it is to be noted that he did not examine the placentas and membranes in these cases, and also that his autopsies did not include microscopic examinations of stillbirths.

In eighty cases of death of infants during the first week after birth Browne[2] found pneumonia in twenty-one, or 26 per cent. He noted the large proportion occurring in prematures, and concluded that the premature infant is about fourteen times as liable to die from pneumonia as the infant born at full term. He commented on the insidious nature of the disease, and the fact that the diagnosis may be missed, even after postmortem examination, without a microscopic examination of the lungs. In several cases the lesions were very hemorrhagic, forming what he believed to be a distinct clinical and pathologic entity. In two cases, with premature rupture of the membranes, and infection of the amniotic cavity, the babies were apparently born with pneumonia, and died after delivery. This finding was confirmed by a later report of five cases of pneumonia in dead-born infants. All of these were in cases of prolonged labor with early rupture of the membranes[3].

The cases studied by us were found in a series of 500 autopsies at the Sloane Hospital during a period of a little over five years. These autopsies are consecutive, with the omission of a certain number of macerated stillbirths and traumatic cases in which no microscopic examinations were made, so that no definite conclusions could be drawn as to the condition of the lungs.

The list includes nonviable and viable fetuses, stillborn and newborn infants, and, therefore, is made up of a much wider variety of conditions than is to be expected in the newborn alone. In the 500 autopsies

we have found evidence of pneumonia in ninety-seven, or 19.4 per cent. Of course, in many of these the pneumonia was not the sole or chief cause of death. It is to be emphasized that the types of pneumonia described here should not be confused with the "pneumonia alba" of congenital syphilis, although a small number of syphilitic babies are included in the series.

The cases may be divided into four groups, basing the classification chiefly according to the probable time of infection and the time of death.

I. Antenatal infection; antenatal or intranatal death.	30 cases.
II. Probable antenatal or intrapartum infection; death usually within three days after birth.	38 cases.
III. Pneumonia with "hyaline membrane" (type of asphyxia neonatorum).	8 cases.
IV. Postnatal infections.	21 cases.

ASPIRATION OF AMNIOTIC FLUID

As our observations have led us to believe that practically all of the cases in groups I and II are caused by infection of the amniotic sac and aspiration of infected amniotic fluid, a study of the relations between the fetal respiratory tract and the amniotic fluid is of prime importance. The lumen of the fetal respiratory tract is continuous with the amniotic cavity. The fetus *in utero* is submerged in the amniotic fluid, which enters the nose, mouth, and pharynx. It appears to be uncertain whether the fluid normally enters the trachea and bronchi, depending on how tightly the glottis remains closed.

The respiratory center of the fetus *in utero* is undoubtedly less responsive than that of the mother, although Ahlfeld[4] obtained tracings from impulses transmitted through the abdominal wall over the uterus, which he believed indicated that the fetus normally made slight but regular respiratory movements. Whether this is true or not, the amniotic fluid is not ordinarily drawn into the atelectatic pulmonary alveoli, except in minimal amounts. In case of asphyxia, however, the fetal respiratory center is undoubtedly stimulated, with resultant expansion of the lungs, and aspiration of amniotic fluid into the alveoli.

While the means of identifying amniotic fluid in the lung have long been described in medicolegal literature, they do not appear to be familiar to many obstetricians and pathologic anatomists. The liquor amnii is not easily detected by its fluid constituents, which in fixed sections appear to give rise to a granular precipitate hardly distinguishable from edema. But, suspended in the fluid, are numerous cornified squamous epithelial cells which have desquamated from the skin of the fetus. In addition, the epidermal cells are accompanied by globules or masses of fat from the vernix caseosa. Lanugo hairs may also

be found. Of these elements the cornified epidermal cells are the most constant, characteristic, and reliable evidence of the presence of amniotic fluid. (Figs. 1 and 2.)

In ordinary sections stained by hematoxylin and eosin for routine examination, the epidermal cells are seen most distinctly when they

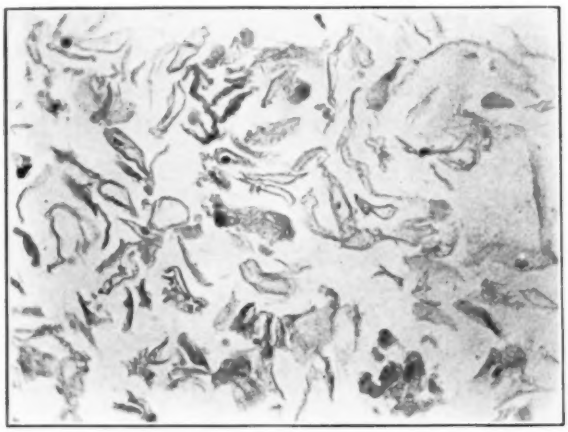

Fig. 1.—Cornified epidermal cells in amniotic fluid. Identification of amniotic fluid aspirated in infants' lungs depends chiefly on the presence of these cells, desquamated from the skin of the fetus. Illustration shows a paraffin section of sediment from an uncontaminated specimen of amniotic fluid from a case of cesarean section. (High power photomicrograph.)

Fig. 2.—Section of fetal skin covered by vernix caseosa, showing desquamating cornified epidermal cells. Large numbers of these cells become dislodged, and float in the amniotic fluid. Fat of the vernix caseosa is not shown in the photograph, having been dissolved as the tissue was embedded in paraffin.

are turned on edge or obliquely to the plane of the section. In this position they are cut so as to appear as coarse, wavy, purple-staining, somewhat refractile threads. When seen on flat, they are not so distinct, as they are thin and transparent. The small round nuclei can usually be seen in only a few of the cells.

Several special stains may be of assistance in the detection of amniotic fluid aspirated in the lungs.

1. The keratin of the epidermal cells may be stained differentially, according to a method proposed by Strassmann[5]. Instead of the original method it was later found that the Gram stain could be substituted. We have found that by our usual technic for the Gram stain the epidermal cells are Gram negative, but, if after treating with aniline methyl-violet followed by Gram's iodine solution in the usual way, the section is decolorized for a very brief time—three to five seconds—with acetone, and then washed and counterstained with safranin, the cornified cells retain the blue color, while the remainder of the section is red.

2. Fat of the vernix caseosa, as Hochheim[6] found, may be demonstrated in the lung in formalin-fixed frozen sections stained by Sudan III and hematoxylin. The red-staining droplets of fat may be present in large numbers, and usually accompany the epidermal cells.

3. In sections stained for the Treponema pallidum by the Levaditi silver method, the cornified epithelial cells are dark brown, or black.

In cases of severe fetal asphyxia, when the anal sphincter has relaxed, and meconium escapes into the amniotic cavity, the small round or oval yellowish brown masses characteristic of meconium may be found, microscopically, mixed with amniotic fluid aspirated into the bronchi and alveoli. Balthazard and Piédelièvre[7] have described a special stain for these particles, for mucin, and lanugo hairs. Meconium is also frequently packed with epidermal cells, derived from amniotic fluid which has been swallowed by the fetus.

No particular significance can be attached to the finding of very small amounts of amniotic fluid in the lungs. This occurs in the majority of cases, and in the newborn may represent only the amniotic fluid present in the nose and mouth, which is drawn down into the lungs with the first respirations after birth. If the air passages are not well cleared before respiration begins, of course a larger amount may be aspirated.

From our own observation, as well as the statements of others, we are convinced that the presence of a large amount of amniotic fluid within the lung is indicative of a certain degree of fetal asphyxia. The causes usually assigned for this condition are insufficiency of the placental circulation, compression or true knots of the cord, and excessive contractions of the uterus.

Not counting any of the cases of pneumonia, there were thirty-nine babies in our own series of autopsies, who were recorded as showing marked aspiration of amniotic fluid. Of these, thirty-one were stillborn, eleven being macerated, and eight died after birth. Of the latter, three were breech deliveries and two cesareans. Among the eleven macerated stillbirths there was one premature separation of the pla-

centa, one cord tight around the neck, and one true knot of the cord. In this last case we found the most marked example of aspiration of amniotic fluid in our records, and it furnishes convincing evidence of the effect of fetal asphyxia. (See Fig. 3.)

The question whether aspiration of a large amount of normal uncontaminated amniotic fluid can give rise to an inflammatory reaction in the lung is a difficult one to decide. The evidence in general seems to be against it, although some of our cases in Group III may be exceptions. The epidermal cells have been found in the lungs for several days after birth without any signs of inflammation. They are not attacked by phagocytes, nor do they cause the formation of foreign body giant cells, but appear to undergo a slow dissolution.

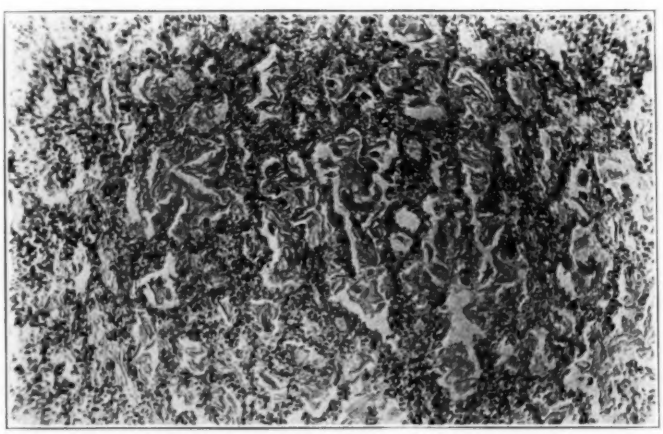

Fig. 3.—Section of lung of a macerated fetus dying from intrauterine asphyxia caused by a true knot in the umbilical cord. The alveoli are packed with epidermal cells carried in by amniotic fluid which apparently flooded the lungs during respiratory movements in utero, brought on by asphyxia.

On the other hand, choking of the air passages by a large amount of aspirated material may lead to a serious condition of asphyxia, if the child survives birth.

PATHOLOGIC CHARACTERISTICS OF CONGENITAL PNEUMONIA

Groups I and II of our series are so closely related in etiology and pathology that they may be considered together as "congenital pneumonia." In the first group the fetus is infected earlier and dies before birth. In the second group the infection apparently begins at a shorter time before birth, or progresses more slowly, so that the baby survives birth, but usually dies within three days.

In the great majority of cases it is practically impossible to recognize the presence of the pneumonia from the gross appearance of the lungs at autopsy. They may be slightly larger than normal and may sink or float, depending on the degree of atelectasis present. They are not consolidated, but have a fleshy consistency. The cut surface has

a reddish moist appearance, and suggests edema and congestion, rather than pneumonia. Pleuritis is rarely noted.

Microscopically, a large proportion of the lungs show a type of lesion which is different from the usual varieties of lobar and lobular pneumonia with which we are familiar. The special feature in this type is the diffuseness or wide extent of the inflammation, which may involve fairly uniformly practically all of the alveoli throughout the whole lung. The exudate within the alveoli consists of a small or moderate number of polymorphonuclear leucocytes, with a few mononuclear cells, and a variable number of red cells. Fibrin is usually absent, or present in minimal amounts. The interstitial framework of the lung is only slightly involved. The bronchi usually contain a small amount of exudate. (Figs. 4 and 5.)

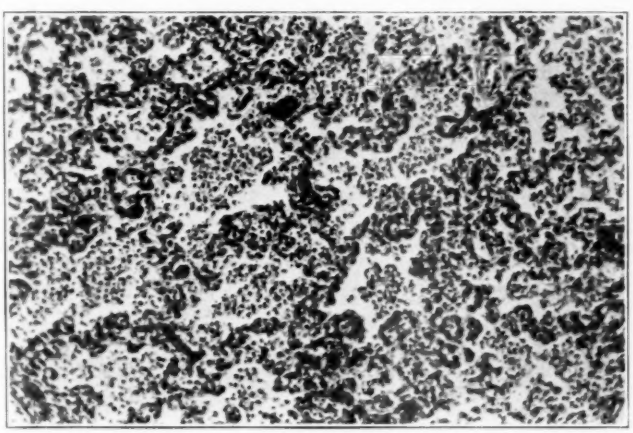

Fig. 4.—Section of lung from infant dying of congenital pneumonia 11½ hours after birth. Nearly all of the alveoli contained polymorphonuclear leucocytes (diffuse type of congenital pneumonia). (Low power photomicrograph.)

The diffuseness of this form of pneumonia is due, we believe, to the fact that it commences in an atelectatic lung, through which the infection is widely spread by the aspiration of infected fluid. Not all of the cases show this diffuse lesion. In many the distribution is distinctly patchy, probably owing to a more irregular and scantier aspiration of infected material, and also to aeration after birth.

In addition to the exudate within the alveoli, one may find a variable quantity of the elements of amniotic fluid, which indicate the mode of conveyance of the infection. (Fig. 6.) But although asphyxia with aspiration of infected fluid undoubtedly aids the spread of infection through the lung, this is not a necessary factor, as the bacterial growth from an infected amniotic sac may be propagated through a continuous stationary column of fluid and secretion from the nose or mouth down the trachea and bronchi to the lungs.

Bacteriologic study of our cases has been incomplete and unsatis-

factory. As the pneumonic lesions are so difficult to recognize at autopsy, only a few cultures were made, but nearly all of the lungs were examined for bacteria in Gram-stained sections. Failure to find organisms so many times led us to suspect that some of the cases might be chemical pneumonias produced by aspiration of amniotic fluid mixed

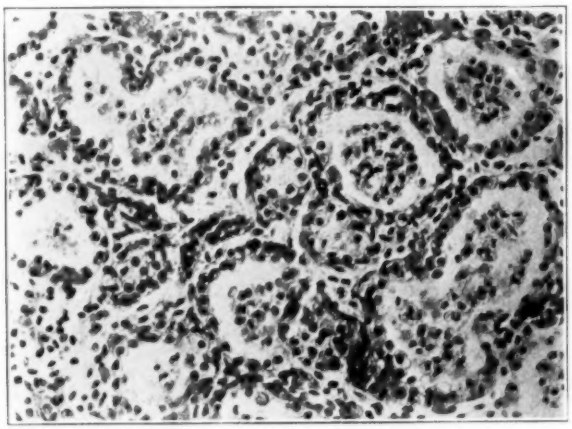

Fig. 5.—High power photomicrograph showing diffuse pneumonia in a nonviable stillborn fetus weighing 590 grams. The glandular appearance of the alveoli, lined by cuboidal epithelium, is due to prematurity. Most of the alveoli contain polymorphonuclear leucocytes. Although the clinical record indicated that the membranes had ruptured only 37 minutes before delivery, a microscopic examination of placenta, cord, and membranes showed acute inflammation, indicating infection of the amniotic sac. Section of the lung contained Gram negative bacilli.

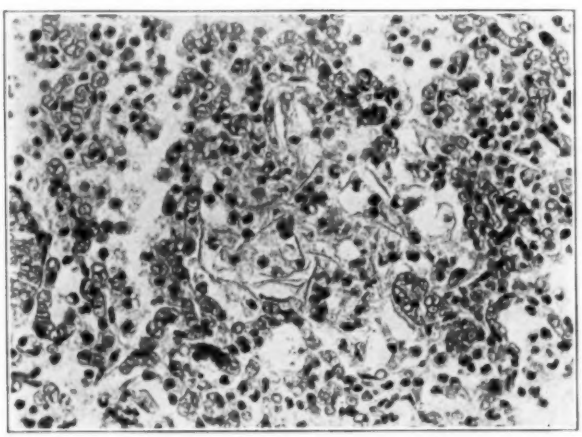

Fig. 6.—Pneumonia from aspiration of infected amniotic fluid. Full-term stillbirth. Membranes ruptured eighteen and one-half hours before delivery. Microscopic examination showed inflammation of surface of placenta and membranes. The air space in the center of the photograph contains leucocytes, mixed with granular debris and cornified epidermal cells from amniotic fluid. The flat epidermal cells, cut obliquely, or on edge, appear as wavy threads.

with antiseptics such as lysol, which might pass through the vagina back into the amniotic cavity. We have not been able to confirm this suspicion, but believe that it is a possibility which should be guarded against.

Analysis of the cases in the different groups has brought out many interesting facts.

GROUP I. ANTENATAL PNEUMONIA: ANTENATAL DEATH

Of thirty infants in this group, six were under 1500 grams, two were between 1500 and 2500 grams, and twenty-two weighed more than 2500.

The distribution of the pneumonia was diffuse in twenty-two cases, patchy in eight. In most of the patchy lesions the exudate was scanty. Fourteen of the thirty cases showed marked aspiration of amniotic fluid.

Clinically, the most significant fact in relation to these cases is that most of them gave a history of premature rupture of the membranes, or prolonged dry labor.

According to the time of rupture of membranes before delivery the cases were grouped as follows:

Under 2 hours	5 cases	Over 2 days	5 cases
2 to 12 hours	3 cases	Unknown	2 cases
12 to 24 hours	4 cases	Unruptured abortion	1 case
24 to 48 hours	6 cases		

Sections from twenty-five of the cases were examined for bacteria, of which only eight were positive, but it is significant that six of these were from the cases having the longest periods of dry labor. The organisms found were cocci resembling staphylococci, streptococci, and Gram-positive and Gram-negative bacilli. Pneumococci were not found in any of the congenital pneumonias.

The placenta and membranes were examined in thirteen of these cases, and eleven were found acutely inflamed. Two were normal.

Slemons,[8] in calling attention to the rôle of infection of the amniotic cavity in the causation of fetal death, stated his belief that a common path of infection is through the amnion to the fetal blood vessels in the chorion. As none of the infants in our series have shown evidence of infection in any way other than through the nose or mouth, we are inclined to think that the respiratory tract is much the commoner route.

In this group there were twelve vertex presentations, eleven versions or breeches, and six forceps deliveries.

The following case illustrates the result of a heavy infection of the amniotic cavity.

CASE 1.—Sloane Autopsy 1144. Stillborn baby weighing 2825 grams, was delivered 4 days and 7 hours after rupture of membranes. The fetal heart stopped several hours before delivery. At autopsy the lungs showed a bronchopneumonia, with marked aspiration of amniotic fluid and meconium. (Fig. 7.) The aspirated material and exudate contained many Gram-positive cocci and Gram-negative bacilli. (Fig. 8.) The lungs contained many emphysematous patches due to collections of gas bubbles. The stomach and upper half of the small intestine contained

gas and large numbers of bacteria. There was no evidence of peritonitis, and culture from the peritoneum was sterile.

The fetal membranes, cord, and surface of the placenta showed intense inflammation.

Except for foul-smelling lochia the mother's record shows no evidence of sepsis, and she left the hospital in good condition.

Another case is one in which an erroneous diagnosis of death from trauma might have been made, without a microscopic examination of the lungs:

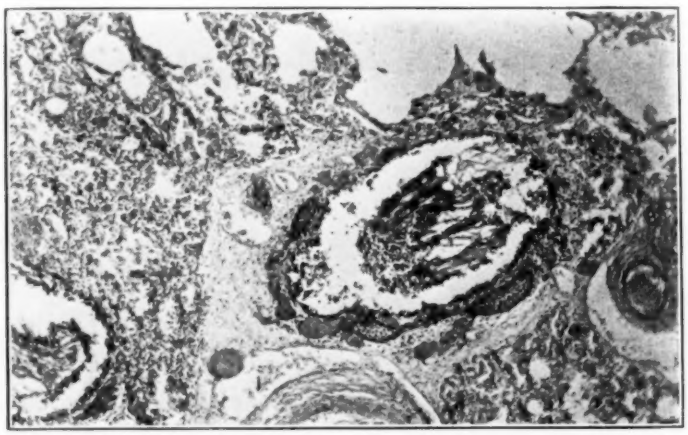

Fig. 7.—Section of lung from Case I. Bronchopneumonia in stillbirth delivered 4 days and 7 hours after rupture of membranes. In the center of the photograph is a small bronchus containing aspirated amniotic fluid and purulent exudate. The alveoli in the upper part of the picture show emphysema from growth of gas-producing bacteria. (See Fig. 8.)

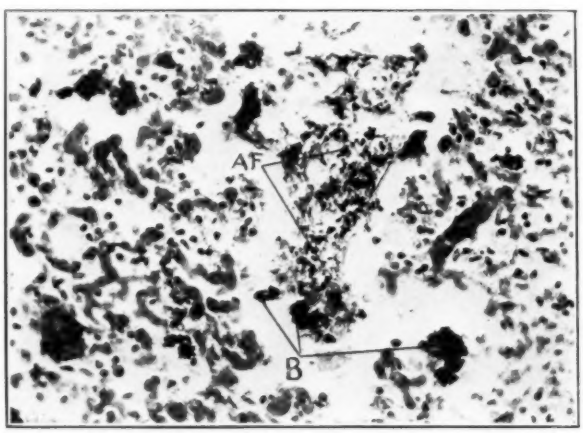

Fig. 8.—Section of lung from Case I, stained for bacteria, which appear in the photograph as irregular black masses (*B*). The bacteria appear to accompany aspirated amniotic fluid, cells from which (*A. F.*), mixed with leucocytes, are present in the air space in the center of the picture.

CASE 2.—Sloane Autopsy 1285. A full-term infant weighing 3600 grams was delivered by rather easy mid-forceps application. The cord was tightly wound around the neck. The baby was alive at birth but could not be made to breathe. Microscopic examination of the lungs showed a diffuse pneumonia with aspiration of amniotic fluid. The sections contained large numbers of staphylococci.

In this case death was probably due to a combination of asphyxia, and pneumonia from aspiration of infected amniotic fluid. The membranes had been ruptured forty-six hours before delivery. The amniotic surface of the placenta, membranes, and cord was acutely inflamed. The mother showed only a slight rise in temperature with offensive lochia.

GROUP II. ANTENATAL INFECTIONS: POSTNATAL DEATH

We agree with Hess Thaysen that nearly all of the infants dying of pneumonia within three days after birth, do so as a result of antenatal infection. There are undoubtedly some exceptions, both as to longer duration of life, and the occurrence of postnatal infection.

In our series of thirty-eight cases there were twenty-one deaths on the first day, ten on the second day, six on the third day, and one on the fourth day.

Ten weighed under 1500 grams, eight between 1500 and 2500 grams, and twenty weighed over 2500.

The symptoms and physical signs were rather meagre and inconstant. The most frequent symptoms noted were cyanosis and difficult respiration. In most cases there was practically no fever, although one case reached 104.8°. Two babies had convulsions. Except for the presence of some râles, physical signs in the chest were practically nil. Apparently it is impossible in most instances to make a clinical diagnosis of congenital pneumonia.

Eighteen cases were recorded as showing a diffuse type of pneumonia at autopsy, while an equal number were patchy in distribution. One case showed a lobar consolidation with pleuritis, and one had abscesses.

Most of the diffuse and patchy lesions showed the usual characteristics of congenital pneumonia. In twenty-one there was evidence of marked aspiration of amniotic fluid. Of twenty-nine lungs examined for the presence of bacteria in sections, the findings were positive in eighteen. The organisms usually found were Gram-positive cocci suggesting staphylococci. Streptococci, Gram-positive and Gram-negative bacilli were also found.

The time between rupture of membranes and delivery was recorded as follows:

Under 2 hours	11 cases	24 to 48 hours	2 cases
2 to 12 hours	12 cases	Over 2 days	2 cases
12 to 24 hours	2 cases	Unknown	9 cases

This group does not show as high a proportion of long dry labors as the first group, nor were the periods so prolonged. This is what might be expected, from the effect on the fetus. That is, the longer the period of dry labor the greater is the chance of the fetus becoming infected and dying before birth. When the period during which infection takes place is shorter, the baby has a better chance of surviving until after birth.

The placenta, membranes, and cord were examined in nine cases. Six were acutely inflamed, one was normal, and two showed evidence of syphilis.

The deliveries were vertex in twenty-six cases, breech in six. Five were forceps cases, one a cesarean section, and one a precipitate in a toilet.

The presence of a focus of infection in the mother has been noted in only a very small number of cases, and so far as we have been able to judge, this is not a very conspicuous factor, nor did many mothers show evidence of postpartum infection.

Eleven of these cases in this group were recorded as having periods of ruptured membranes under two hours. This would seem to be an argument against the rôle of infection of the amniotic cavity as the explanation of all these pneumonias. But in one case where the membranes were said to have ruptured only five minutes before delivery, and in another rupturing thirty-three minutes before delivery, the placenta and membranes were found to be acutely inflamed.

This means that we must accept the possibility of infection of the amniotic cavity from the cervix through unruptured membranes, or, as seems more reasonable, attribute the entrance of infection to slight premature ruptures which escaped notice, such as so-called "high ruptures."

A "diaplacental" infection, conveyed to the amniotic sac through the placenta from some focus of infection in the mother is another possibility which must be admitted, as a few fairly convincing cases of this kind are recorded in the literature. That such a mode of infection is frequent is improbable, and we have not been able to place any of our own cases in this group.

Aspiration of vaginal secretion containing bacteria may explain the infection in some cases of congenital pneumonia, and according to Hess Thaysen, is the usual method, but from our own observations we do not believe this to be true.

The presence of an acute inflammation in the placenta and membranes (found in the great majority of the pneumonia cases in which they were examined) indicates the frequency of infection of the amniotic sac and, when such infection is present, conditions certainly favor extension to the fetal lung, as we have already shown. The time when the infection reaches the lungs is variable. It may occur *in utero,* especially when aspiration of amniotic fluid is brought about by asphyxia. If, at the time of birth, infected amniotic fluid is present in the nose and mouth of the baby, the first inspirations may draw this material down to the lungs. This is probably the mode of infection in some of the cases dying two or three days after birth.

On the other hand, as regards aspiration of vaginal secretion, the mechanical conditions obtaining during passage of the head through the birth canal are against it. Most of the material is probably pushed

out in front of the advancing head, while the close approximation of the vaginal wall against the nose and mouth tends to prevent any material from gaining access to them.

GROUP III. PNEUMONIA WITH "HYALINE MEMBRANE"

This includes cases of a type previously reported by one of us[9] as "pneumonia in the newborn with lesions resembling influenza." Clinically, they are cases of "asphyxia neonatorum." The typical history is that after a normal delivery the baby breathes spontaneously at first, but soon begins to have attacks of cyanosis and dyspnea, which recur at intervals, and with increasing severity, until death. Such cases are probably often diagnosed clinically as atelectasis, or hypertrophy of the thymus. The thymus is within normal limits, however, and incidentally we would state, in contradiction of many current pub-

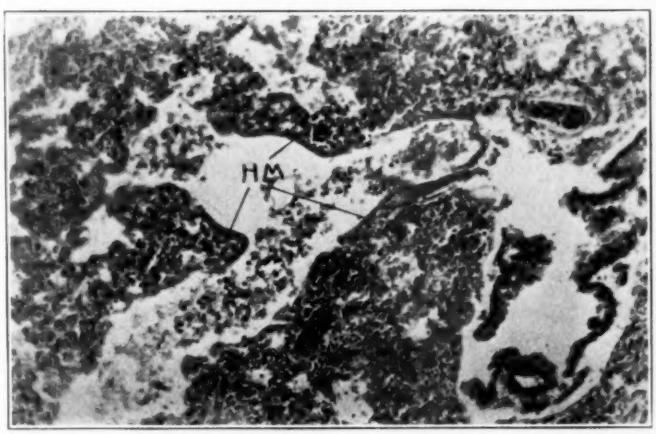

Fig. 9.—Section of lung illustrating type of pneumonia in newborn, with lesions resembling influenza. (Group III.) The air passages in the center of the photograph (dilated alveolar ducts and alveolar sacs) are lined by a narrow layer of homogenous material (hyaline membrane, *H. M.*). The ducts contain a few leucocytes. Premature infant. Death 18 hours after birth.

lications on the subject, our opinion that a true pathologic hypertrophy of the thymus is rare. In our series of over 500 autopsies we have not found a convincing case.

Pathologically, the resemblance of the lesions to those of influenza depends chiefly on the presence of a layer of homogeneous material—a "hyaline membrane"—which lines many dilated alveolar ducts and alveolar sacs, and some of the alveoli. This material stains reddish in hematoxylin and eosin sections. It does not give a reaction for fibrin. The degree of inflammatory reaction, as indicated by the presence of leucocytes, is usually moderate or slight. (Fig. 9.)

These lesions do not seem to be caused by infection of the amniotic cavity following premature rupture of the membranes.

Negative bacteriologic findings, failure to connect these cases with

epidemic influenza, and the fact that similar lesions have been found after inhalation of war gases, and experimentally after intrabronchial insufflation of hydrochloric acid, led us to suspect that this lesion in infants might also be due to the aspiration of an irritating substance. The agents naturally considered were lysol, and the soap which is sometimes used in lubricating the vagina. These materials were not used in some of the "hyaline membrane" cases, however.

To determine whether such lesions could be produced by lysol and soap, we injected various quantities of these substances intratracheally in rabbits, but the lesions produced were not typical of those in infants. Injection of amniotic fluid alone also failed to produce lesions in rabbits' lungs. Whether in certain conditions amniotic fluid can become abnormally acid or irritating must also be considered. In two specimens of uncontaminated amniotic fluid obtained from cesarean section cases, which Mr. T. F. Zucker tested for us, the hydrogen-ion concentration was found to indicate slight alkalinity.

Experimentally, a hyaline membrane resembling that noted in the infants' lungs, was produced by intratracheal injection, in a rabbit, of a small quantity of egg albumen. This suggests that the membrane is produced by a viscous material, which adheres along the walls of the air passages.

Two observations have led us to believe that the material composing the hyaline membrane in babies' lungs, is derived from epidermal cells and fat aspirated with amniotic fluid, probably some time previous to labor. We have several times observed epidermal cells undergoing a transformation into hyaline material, and adhering to the walls of the air passages. In his study of the aspiration of the fat of vernix caseosa into the lungs, Hochheim mentions two cases in which he found layers of homogeneous material adhering to the walls of some of the alveoli, and containing numerous droplets of fat. Believing that these were cases similar to our own, we also studied frozen sections stained by hematoxylin and Sudan III, and found that the hyaline membranes were loaded with fat droplets.

It seems probable, therefore, that this lesion consists in the coating of the walls of the smaller air passages with a layer of viscous material derived from old aspirated cells and fat of the vernix caseosa. While the fetus is *in utero* no harm is produced, but as soon as respiration is established, the air passages become more or less choked by this hyaline material and asphyxia results. The inflammatory reaction may be the result of a complicating infection or secondary to mechanical irritation. This view is strengthened by the fact that in several cases we have noted the presence of a hyaline membrane without inflammatory reaction.

The lungs in this type of asphyxia often present a considerable degree of atelectasis, which is probably due to the plugging of some of the bronchioles by masses of hyaline material. (Figs. 10 and 11.) As

in other cases of so-called congenital atelectasis, the unexpanded condition of the lungs is a secondary lesion. Too often, in assigning causes for death in the newborn, atelectasis has been treated as if it were a primary disease. It should be recognized that in all cases atelectasis is secondary to some primary cause. The most frequent causes are prematurity, trauma, and mechanical obstruction of the air passages.

Fig. 10.—Section of lung from same case as Fig. 9, showing choking of bronchioles and alveolar ducts with material derived from aspirated amniotic fluid and vernix caseosa.

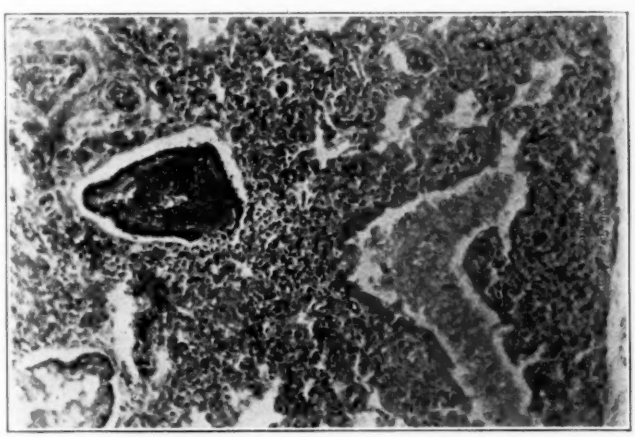

Fig. 11.—Section of lung from same case as Fig. 9. A bronchiole, at the left, is completely plugged with material derived from aspirated amniotic fluid and vernix caseosa. The adjacent lung tissue shows a considerable degree of atelectasis.

GROUP IV. POSTNATAL INFECTIONS

Of twenty-one cases of pulmonary infection which seemed to be clearly postnatal, all but six were in prematures. All but two died within a month after birth, and in half of the number, death occurred between the tenth and fourteenth day.

There were two cases of metastatic infection from the navel, one due

to a streptococcus, the other to a Staphylococcus aureus. Four had abscesses of the lung, and there were two cases of lobar consolidation in which the organism found was Staphylococcus aureus. Pneumococci were found only once. In three infants the lesions were markedly hemorrhagic.

The frequent finding of the Staphylococcus aureus in the infecting organism in these pulmonary lesions is of especial interest. Microscopic examinations of sections of the navel have been made in all these cases, to exclude the possibility of metastatic infection. In many cases the clinical histories of the cases have suggested infection from aspiration of food, either after regurgitation or during gavage feeding.

The pathologic characteristics of the lesions in this group of infections are similar to those found in later infancy.

SUMMARY AND CONCLUSIONS

1. In a series of 500 autopsies on the stillborn and newborn, ninety-seven or 19.4 per cent showed evidence of pneumonia. Sixty-eight or 13.6 per cent were probably infected before birth.

2. Congenital pneumonia, due to antenatal infection, is an important complication of birth, and an exceedingly frequent cause of mortality in the stillborn and newborn. The obstetrician should appreciate the importance and significance of this condition, and adopt means for its prevention.

3. The great majority of the cases of congenital pneumonia are apparently due to aspiration of infected amniotic fluid following infection of the amniotic sac after premature rupture of the membranes.

4. Cases of infection of the amniotic sac during dry labor are not usually clinically septic. The danger of this infection is disproportionately greater for the child than for the mother.

5. A study of the condition of the vagina and cervix preceding labor may indicate the line of attack in prophylaxis of this complication.

6. All autopsies on the stillborn and newborn should include an examination of the placenta, cord, and membranes.

7. Congenital pneumonia shows pathologic characteristics which differentiate it from infections acquired after birth.

8. A knowledge of the means of identification of amniotic fluid aspirated within the lungs is important for the study of fetal asphyxia and congenital pneumonia.

9. The presence of a large amount of amniotic fluid within the lungs is an indication of fetal asphyxia.

10. Aspiration of uncontaminated amniotic fluid does not usually produce an inflammatory reaction.

11. A special type of asphyxia neonatorum with or without inflam-

matory reaction, is apparently due to antepartum aspiration of amniotic fluid containing epidermal cells and fat of the vernix caseosa.

12. In death from postnatal infection, occurring frequently in premature infants, a frequent source is aspiration of food.

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437 WEST 59TH STREET. (*For discussion see page* 267.)

THE CONTROL OF ECLAMPSIA CONVULSIONS BY INTRASPINAL INJECTIONS OF MAGNESIUM SULPHATE*

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IN several investigations, Meltzer and Auer[1, 2, 3, 4, 5] studied the effect of magnesium salts upon the animal body. The starting point for the investigations was the idea that magnesium salts may have a specific relation to the inhibitory processes of the vital functions. Among the results which have been obtained thus far by these investigators may be mentioned:

1. General anesthesia by subcutaneous injections of magnesium sulphate.[6] In the different species of animals with which these investigators experimented, rabbits, cats, dogs, guinea pigs, white rats, frogs, and fowls, they found without any exception: (1) That a certain dose of magnesium sulphate will produce a deep, often long lasting anesthesia with complete relaxation of all the muscles and abolition of some of the less important reflex activities, which anesthesia terminates in perfect recovery. (2) That a large dose of magnesium sulphate will produce a profound anesthesia and general paralysis which leads sooner or later to a calm death without being preceded or accompanied by any symptoms of excitation.†

2. The intravenous injection of magnesium sulphate for anesthesia in animals.[7] The use of magnesium sulphate by intravenous injections was in general discouraged by Meltzer.[8] However, a series of

*Read before the New England Division of the American College of Surgeons, May 15, 16, 1923, Worcester, Mass.

†The dose of magnesium sulphate which causes complete anesthesia lies between 1.75 and 1.25 gm. per kilo for the rabbit.

experiments made by Meltzer and Auer with intravenous injections of magnesium sulphate in cases of experimental tetanus, and the meager but satisfactory experience which Kohn[9] and Straube[10] had with the employment of this method in cases of tetanus in human beings induced these investigators to take up the experimental study in animals of the employment of magnesium sulphate by intravenous injections, for the purpose of producing anesthesia.

These experiments justify the following conclusions: By the intravenous injection of this salt into dogs at a certain rate, a stage can be reached where the abdominal walls are completely relaxed and where sections of the abdomen and stimulation of sensitive parts of the parietal peritoneum do not produce pain or elicit any reaction of the animal. At the same time spontaneous respiration may still be maintained within normal limits. When the injection of the salt is continued for a long period, the paralytic effects of the magnesium sulphate will set in, even when administered at a slow rate. The paralysis of the respiratory function is readily met by intrapharyngeal insufflation. When the respirations of the animal are accompanied by insufflation, the paralytic effect of the magnesium sulphate may be abolished fairly rapidly by an intravenous injection of about 10 c.c. of a 2.5 calcium chloride solution.

3. Interruption of conductivity by local applications of magnesium salts to nerve trunks. Local applications to nerve trunks block the conductivity and abolish the excitability of the nerves.

4. Production of anesthesia by intraspinal injections of magnesium salts. The last effect has a special bearing upon the subject of this paper and hence it will be dwelt upon at greater length.

The first experiments made by Meltzer and Auer[11] by injecting a solution of magnesium sulphate in the subarachnoid space of the spinal cord, were made upon dogs, cats, and rabbits. The salts were injected in the lumbar region of the spinal cord which caused anesthesia and paralysis from the pelvis down. The effects were, however, variable. The effects became more uniform as soon as monkeys were used for the experiments.

On the basis of these experiments on these animals they found in a general way that a dose of 0.06 to 0.07 grams of magnesium sulphate to one kilo body weight injected through the fourth lumbar space definitely produces, sooner or later, anesthesia and paralysis more or less pronounced, from which the animal recovers in eight to twenty hours. Repeated at proper intervals this dose caused in many of the monkeys the same general effect without recognizable harmful after-results. This dose, or one a little larger, caused in some instances more pronounced after-effects; the paralysis spread upward and the animal became, in time, generally anesthetic. Even from these pro-

found effects the animals recovered completely in the above-mentioned time. A still larger dose produced, in a comparatively short time, a respiratory paralysis from which the animal died without convulsions.

But even in these cases artificial respiration through a tracheal tube, begun while the heart beat was still present, would soon restore life, and if continued long enough the animal would begin again to breathe spontaneously. A dose of salts which is just sufficient to paralyze the respiration is practically without effect upon the heart beat and blood pressure, that is, without direct effect.

Using these experiments with monkeys as the basis, spinal anesthesia has already been employed upon human beings in cases of tetanus by Blake,[12] Logan,[13] Peck.[14] It may be stated here that in human beings a dose of 1 c.c. of a 25 per cent solution for each 20 pounds of body weight of the patient produces, after some time, deep anesthesia accompanied by considerable relaxation of all the muscles, lasting 24 hours or longer. The respiration is sometimes reduced but the pulse and blood pressure remain nearly normal.

As the results of their experiments of the effect of intraspinal injections of magnesium salts upon tetanus, Meltzer and Auer[11] give the following conclusions:

Intraspinal injections of magnesium sulphate in doses which do not affect the respiratory center or the vital functions, are capable of abolishing completely all clonic convulsions and tonic contractions in cases of human tetanus, and experimental tetanus in monkeys. The relaxing effects of the injections may last 24 hours or more.

In experimental tetanus in monkeys early intraspinal injections of magnesium salts are capable of retarding the progress and development of the tetanus symptoms.

The use of magnesium sulphate for practical purposes of anesthesia in human beings was studied by Haubold and Meltzer[5] by intraspinal method. Meltzer has said "The effects of intraspinal injections were so prompt, so striking, and so harmless, that I felt encouraged and prompted to induce some of my surgical friends to test it in proper cases of human surgery. Twelve patients have so far been operated upon under the sole or essential influence of the intraspinal injection of magnesium sulphate."

Seven operations were performed by Dr. Haubold at the Harlem Hospital, three by Dr. Willy Meyer at the German Hospital, and two by Dr. Blake at the Roosevelt Hospital, all of New York. The dose used was 1 c.c. of a 25 per cent solution for each 20 pounds of weight of the patient. Some of these cases were assisted by small amounts of chloroform. The amounts of anesthetics used varied between 1.5 c.c. to 15 c.c. of chloroform. Chloroform was given in the first eight cases, none in the last four cases. The pulse, respiration and blood pressure remained perfectly normal.

While serving as a house officer at the Massachusetts General Hospital, my (Alton) interest in the intraspinal injection of magnesium sulphate was first aroused. While on duty, a female child, one year old, was admitted to the accident ward. One hour before admission the child had swallowed 12 to 14 pills which its father was taking for stomach trouble. The prescription showed them to contain 1/60 grains of strychnine. When the child was first seen it was cyanotic and in an almost continuous convulsion, in which opisthotonos was frequent, with periods of total respiratory inhibition.

Ether was at once administered and the stomach tube passed. In the vomitus coming about the tube and in the stomach washings, three pills and several fragments of pills were recovered. Sodium bromide, 45 grains, was given by rectum, but was at once expelled. Twice the anesthetic was removed, but the child on both occasions had severe general convulsive seizures with opisthotonos and respiratory inhibitions and was saved only by using artificial respiration to get it under the anesthetic.

On account of the clinical similarity of this case to a case of tetanus which had come under our observation, and the similar condition in the spinal cord, we determined to give magnesium sulphate intraspinally. Following the advice of Blake,[15, 16] we injected 0.9 c.c. of a 25 per cent solution in the fourth lumbar space, keeping the head well elevated. The anesthetic was removed. The child at once recovered, seemed lively, and in no danger from respiratory paralysis. Apparently there was some loss of motor control in both legs, but without loss of the knee jerk reflexes.

The convulsions did not recur. The patient was discharged apparently normal. Stimulated by the good result of this case, we (Cutler and Alton) planned a series of experiments on cats[17] to test the efficacy of magnesium sulphate to control strychnia convulsions. After determining the minimal lethal dose we found that after injecting the strychnine the convulsive attacks could be controlled by the injection of magnesium sulphate; i.e., 1 c.c. of a 25 per cent watery solution of the salt to each 20 pounds of body weight.* In every case following the injection of the magnesium sulphate the same phenomena were obtained: (1) flaccidity to almost total paralysis of the hind legs with failure of response to external stimuli; (2) continued increase of reflex irritability in the rest of the body, gradually diminishing and invariably progressive from the lower spinal region upwards. Few animals evinced any weakness in their hind legs 24 hours after the experiment.

We feel that the results obtained in the human case and in our

*The more recent advice of Meltzer[18] is 0.5 c.c. per 20 pounds in very young children.

animal experiments justify the supposition that magnesium sulphate may be of use in controlling cases of poisoning by strychnine.

Encouraged by the results of the various experiments on the control of convulsions in strychnine poisoning by the intradural injection of magnesium sulphate, we (Lincoln and Alton) planned to test the effect of this salt, given in the same manner, on the convulsions of eclampsia.

When these experiments on eclampsia convulsions were being carried out by us, we were unaware of the fact that similar efforts had been made previously by others. As early as 1907, H. Einar[19] of a Norwegian college reported the use of this drug with instantaneous results in a case of eclampsia having violent convulsions.

For puerperal eclampsia there are two lines of treatment: (1) the obstetrical, and (2) the treatment to control empirically the symptoms as they arise. The three main indications are: (1) To control the convulsions; (2) to unload the kidneys, and (3) to eliminate the toxins from the organism.

In the four cases which we are about to report, all these lines of treatment were carried out.

CASE 1.—Patient twenty-eight years old, eight months pregnant, started in labor with rupture of membranes at 6 P. M., Nov. 5, 1919, and was delivered normally at home at 10:30 A. M., Nov. 6. Thirty minutes after delivery she had a convulsion. She had two more convulsions before being admitted to the hospital on Nov. 6 at 1:15 P. M.

Patient had measles in childhood and repeated attacks of tonsillitis. She is still subject to tonsillitis, having had four or five attacks during the past six years. Has frequent nose bleed. Married three years. Two miscarriages, one at two months, the other at two and one-half months. Cause of the miscarriages was undetermined. Last period began March 19, 1919. Patient remained in good condition through this pregnancy with no early nausea or vomiting. Urine was tested two weeks previous to labor and found negative. (Before patient was discharged from hospital she stated that she could remember nothing for five days previous to labor, nor could she remember anything about her labor.) Her family state that they noticed nothing unusual about her except that she had slight edema of her face, hands, and ankles for a month previous to labor and she complained of headache and vomited the night before delivery.

Physical Examination.—Patient was in a state of coma on admission. Skin pale, dry, with edema of face. Tongue clear. Eyes slight nystagmus, pupils equal and reacted to light and later to accommodation. Tonsils were enlarged. Teeth showed much pyorrhea, see x-ray report and later treatments. Glands negative. Extremities showed slight edema. Heart and lungs negative. Pulses equal and good quality. The abdomen was slightly distended and tympanitic. Uterus well contracted.

Progress of Case.—Shortly after admission the patient had a convulsion. Eliminative treatment was started, i. e., dry packs, enemata, magnesium sulphate and forced fluids. As a result of this treatment the patient perspired freely. Eight ounces of urine was obtained by catheterization. Four hours later there was another convulsion. A lumbar puncture was done, fluid not under pressure, 20 c.c. of clear fluid removed. Convulsion during the puncture. One hour later a venesection

was done with the removal of 500 c.c. of blood. The blood pressure fell from 178-110 to 136-96. An intravenous of sodium bicarbonate was given.

An hour later another convulsion. Perspiring freely, taking fluids well, semiconscious. Five hours later another convulsion. Five hours later another convulsion. Edema of legs and face increasing. Dull mentally between convulsions. Pulse 120 to 140, irregular. Three hours later venesection, 200 c.c. of blood removed and 5½ c.c. of 25 per cent magnesium sulphate solution given intraspinally. Following the intraspinal injections of magnesium sulphate there was some headache, conscious but still sluggish mentally, slight nausea, restless, eyes staring, and some nystagmus. After an intermission of eighteen hours there was another convulsion. A lumbar puncture was done, 3 c.c. of fluid removed and 5½ c.c. of 25 per cent magnesium sulphate given intraspinally. Patient quite restless, nystagmus, convulsive movements of upper extremities and facial twitchings with occasional fixed gaze in eyes. The following day the patient was very comfortable. Clearer mentally. General condition slowly improving. Edema of face nearly gone, some frontal headache. Passing urine freely.

Condition gradually improved for three days and part of the following day when there was another convulsion after an intermission of 92 hours. Three hours later another convulsion. Three hours later another convulsion followed by involuntary urination and defecation. Three hours later another convulsion. Edema increasing. A lumbar puncture was done, 10 c.c. of clear fluid removed and 5 c.c. of 25 per cent magnesium sulphate was given intraspinally. Convulsions ceased, had a good day, fairly clear mentally. There was motor paralysis of legs which cleared up sixteen hours after the injection. The following day the patient was markedly improved. Edema practically gone. There were no more convulsions. The patient steadily improved. Her blood pressure gradually dropped to 115-80, where it remained. Her mental condition has been clear since the eighth day in the hospital.

On admission the urine showed a heavy cloud of albumin which cleared up gradually. At times the sediment showed hyalin and granular casts, some red blood cells and white blood cells. The spinal fluid showed no growth in 48 hours. There was no increase in cell count. Colloidal gold test was negative. Wassermann blood test was negative. X-ray of teeth showed several apical abscesses.

Thirty-two days after admission the abscessed teeth were removed, without any reaction.

During the course of her convulsions the patient received a limited amount of morphine subcutaneously, not more than eight doses of ¼ grains in all, and never enough to show any effect on respiration. The patient was discharged well, on the thirty-fifth day after admission.

CASE 2.—Admitted to hospital at 4:20 A. M., March 22, 1920. American, white, age twenty. Family history negative. Measles and pertussis as a child. Menses always regular, normal in amount and character, until the present pregnancy. No miscarriages. Present pregnancy—last menstrual period in July, 1919. Two months previous to admission contracted a severe "cold" and never fully recovered from it. Urine examined at that time said to be negative for albumin. Two days ago patient complained of headache and the family physician found albumin in the urine. During the night the patient had severe headache and pain in the epigastrium. Vomited at 2 A. M. today and complained of a blurred vision.

Convulsions started at 4 A. M. Having convulsion on admission at 4:20 A. M. The patient had four severe convulsions within two hours. Each convulsion lasting from seven to nine minutes. Eliminative treatment started. At this stage a physical examination was done. Throat negative. Teeth showed pyorrhea with bleeding from gums. Two crowned teeth. Heart and lungs negative. Abdomen

showed tumor of pregnancy. Fundus 5 cm. below ensiform. Fetus in vertex presentation. Temperature 100; Pulse 120; Respirations 20. Blood pressure 130-70. A catheterized specimen of urine contained a large amount of albumin. Two hours after admission a low forceps delivery was done under ether anesthesia, with small amount of hemorrhage.

Progress of Case.—Nine hours after delivery there was a convulsion. An hour later another convulsion which was more severe. An hour later a lumbar puncture was done, 10 c.c. of clear fluid was removed and 5 c.c. of a 25 per cent magnesium sulphate was given intraspinally. In spite of forced fluids, hypodermoclysis and stimulants the patient did not improve. Six hours later the temperature was 107° F., pulse 120; respirations Cheyne-Stokes in character. Two hours later the patient had spells of cyanosis with evidence of edema of the lungs. The general condition grew steadily worse and the patient died eighteen hours later. There were no convulsions after the administration of the magnesium sulphate, but the toxemia could not be overcome. The placenta showed several large, irregular, gray, fine areas along its edge and these, microscopically consisted of placenta tissue which had undergone hyaline degeneration.

Autopsy.—There was edema and injection of the brain. The convolutions were flattened. The longitudinal sinus was filled with bloody fluid. On section the ventricles contained a large amount of clear fluid. The stomach and intestines were much distended with gas. The peritoneal cavity contained a moderate amount of straw-colored fluid. The pericardium contained straw-colored fluid in excess. The heart was not remarkable. The lungs were voluminous and dark red, and contained an excess of bloody, frothy fluid. The liver was large with a pale surface containing irregular red blotches. On one section the cut surfaces were yellow-brown with irregular red blotches, the same character as on the surface.

CASE 3.—Woman, age eighteen, married, housewife. Admitted to hospital March 9, 1921, at 10:30 P. M.

History.—F. H. negative. P. H. measles, pertussis and parotitis in childhood. Appendicitis four years ago. Otherwise always well. Married one year and eight months. First pregnancy. Catamenia regular every twenty-eight days, duration five to six days. Last menstruation latter part of May, 1920. Bowels regular. Frequent micturition. No headaches, edema, neuralgia or acute infections. Nausea and vomiting each morning.

Examination on Admission.—Well developed and nourished woman. Pupils round and equal, react normally to light and accommodation. Many carious teeth. Neck and thorax negative, lungs normal. Heart shows no enlargement. Presystolic murmur at apex, systolic shock. Abdomen presents a normal tumor of pregnancy.

Progress of Case.—Patient in first stages of labor, contractions strong and regular. Presentation O. L. A. Fetal heart rate 140 in L. L. Q. The legs show no edema. Right K. J. absent, left K. J. active. Pulse 90—fairly good quality. Temp. 99° F., resp. 22. B. P. 172-100. Cervix fully dilated two and one-half hours after admission. Second stage of labor was three hours in length. Normal delivery with obstetrical ether. A moderate amount of blood was lost during the third stage of labor. Blood pressure after delivery was 152-100. Seven hours after delivery the patient had a convulsion and lost consciousness; twenty minutes later she had another convulsion. Blood pressure following first convulsion was 175-100; after second convulsion 150-80. The third convulsion followed two hours later. A lumbar puncture was done and 10 c.c. of clear spinal fluid was withdrawn and 4 c.c. of magnesium sulphate (25 per cent solution) was given intraspinally. Following this treatment the patient had considerable pain in the back and legs. A subcutaneous injection of morphine gr. ¼ was given. The patient remained

quiet for eight hours. Breathing became shallow and there was some cyanosis. Pulse rose to 120 but remained good quality. Blood pressure 100-50. Oxygen was administered which relieved the cyanosis. Patient was catheterized and eight ounces of cloudy urine were obtained. Two hours later the temperature rose to 104.2° F., pulse 88, resp. 8. A hypodermoclysis of normal saline 700 c.c. and colonic irrigations were given. Two hours later the patient became conscious and the temperature dropped.

The following day the patient showed much improvement. The abdomen was distended, which was accompanied by some discomfort. Twelve hours later the patient developed an eruption on both arms, face, trunk and legs, which caused considerable discomfort. Examination showed a sensory disturbance extending from the lumbar region to both knees, but more on the right. Patient voids involuntarily. The neurologic symptoms were thought to be due to spinal root inflammation and the general excellence of the magnesium solution was questioned. The patient gradually recovered and was discharged in good condition to the Out-Patient Department seventeen days after delivery.

CASE 4.—Woman, age twenty-three, married, housewife. Admitted to hospital September 17, 1920 at 9 A. M.

History.—The patient was unconscious on admission and a good history could not be obtained after death from the relatives. The most important facts of her previous illnesses were, that she had had luetic infection six years ago for which she was treated for two years, and that since the infection she has been pregnant three times before this pregnancy. The first pregnancy resulted in a premature macerated fetus. The second in a miscarriage, and the third in a full term normal delivery, but during the last pregnancy the patient's legs were markedly swollen. The Wassermann reactions, whenever taken were always positive.

Present Pregnancy.—Her last menstruation was on January 1, 1920, eight and one-half months ago. The patient had occasional nausea and vomiting throughout her pregnancy. As a rule she had loose movements with edema of her legs beginning early in pregnancy. According to her attending physician albumin and casts were found early in her pregnancy. The last three weeks before admission her blood pressure rose to 220 systolic and there was excessive albumin in her urine. Ten days before admission she was given large doses of protiodide of mercury, i. e., four grains three times a day, which was continued until she was admitted to the hospital.

Physical Examination.—On admission the patient was unconscious and not in labor. Temperature 98° F., pulse 70, resp. 22. Blood pressure was 190-130. She was well developed and nourished. Face, hands and legs edematous. Pupils irregular, unequal and contracted, there was a corneal scar on her left eye. Heart and lungs were negative. The abdomen showed a full term pregnancy. Vaginal examination showed a conical undilated and fairly firm cervix, the fetal head was high.

Progress of Case.—From admission the patient never regained consciousness. Previous to admission she had had four convulsions and after admission had three more, increasing in intensity and duration from 45 seconds to four minutes. After her second convulsion in the hospital which was accompanied by a slight bloody vaginal discharge, the fetal heart-beat disappeared. She was put in a hot dry pack and a spinal puncture was done and 5½ c.c. of a 25 per cent magnesium sulphate solution were given intraspinally. Murphy drip was started but it was not retained. The convulsions ceased after the administration of magnesium sulphate, but the general condition of the patient continued to fail. Five hours after admission the pulse became poor in quality. Stimulation was given and an

intravenous saline injection given after the removal of 18 ounces of blood. The pulse then improved and remained at 76 but weak in quality till the end. The blood pressure was 50 systolic and 20 diastolic, three quarters of an hour before death. Respiration poor and weak 15 minutes before death. Adrenalin 15♏ were given and a pulmotor used without effect. Patient died at 4 P. M., seven hours after admission.

Autopsy.—Uterus on section showed placenta of normal thickness but with hemorrhage between fetal and maternal portions of concealed type, which had separated ⅓ of the placenta. Fetus well formed, apparently at term with no abnormality of viscera found. Epiphyses of femur (upper) normal. Liver very large pale gray. Kidneys, large, both capsules stripped from kidneys but adherent to peritoneal tissues. Both kidneys showed healed areas (scar tissue) apparently of old septic origin. A few of these scars on section seemed to pass to medulla, they were mostly cortical. No pus or active foci found. Cortices pale, of normal thickness. Medullae somewhat cyanotic, pelvis normal. Adrenals, large, but no congestion. Lungs, freely movable, some edema in lower lobes, no scars, no enlarged bronchial nodes. Heart, large in systole, no myocardial disease. Aorta, hemoglobin stained with slightly elevated patches of yellowish color, extending down as far as coeliac axis, more numerous in ascending aorta. Other great vessels normal. Head not examined. Other organs apparently normal. Diagnosis: Chronic nephritis, syphilis, antepartum toxemia of pregnancy, with convulsions, antepartum concealed hemorrhage from premature separation of placenta.

REPORT ON LITERATURE

Einar, H.[19] Two Cases of Puerperal Eclampsia with Injection of Magnesium Sulphate Intraspinally.

CASE 1.—The patient, a woman of forty, after three severe convulsions, had a forceps delivery. Six hours after birth, frequent, violent convulsions recurred. Nineteen and one-half hours after birth, a spinal puncture was performed and 6 c.c. of a 25 per cent solution of magnesium sulphate was injected. Results were apparently instantaneous. The temperature, pulse, and respiration improved quickly in the course of the day. There were no new attacks.

CASE 2.—A twenty-six year old primipara had eclampsia in the seventh month of pregnancy. After three convulsions, 4 c.c. of a 25 per cent solution of magnesium sulphate was given intraspinally. The effects were not so clear, rapid or good, as in the first case. The convulsions were partially controlled.

Guggisberg,[20] reports two cases.

CASE 1.—A primipara of twenty-four years was seized with severe eclampsia at the end of her pregnancy. A cesarean operation was performed, with great loss of blood, and at the close of the operation, 10 c.c. of a 15 per cent solution of magnesium sulphate were injected into the lumbar sac. Soon after, a series of attacks began, continuing every 5 to 10 minutes until thirty had occurred. The attacks were limited principally to the upper extremities and the face. Two hours after injection reflexes of the lower limbs were almost absent. The patient died, with increasing weakness of the heart. The necropsy showed pronounced myocardiac fattening and subepicardial hemorrhage.

CASE 2.—After giving normal birth to a child, the patient, a bipara, was seized with convulsions. She was carried into a dark room and treated according to Stroganoff's method, with chloralhydrate, and with morphine and venesection (400 c.c.). After the sixth attack, lumbar puncture was done and 6 c.c. of a 15 per cent magnesium sulphate solution was injected. The patient relaxed and slept. Three

days later the patient had another attack, and died. The necropsy showed acute myocarditis, subepicardial hemorrhage, pneumonia, and renal and hepatic fattening.

Heimann.[21] Therapy in Eclampsia. Mention is made of the use of magnesium sulphate by Rissmann, but the writer apparently has had no experience with it, and refers to it as a method to be used only in case of last resort.

Hugel.[22] Treatment of Eclampsia with a High Per Cent Sugar Solution. The writer, in reporting on the intravenous injection of sugar solutions, as a substitute for the saline solution (a war method adopted by him for the treatment of eclampsia in pregnancy) refers to the use of magnesium sulphate and other substances which prevent coagulation of the blood and check convulsions, they are less physiologic than the sugar solutions.

Kaas, Johan.[23] A Case of Puerperal Eclampsia Treated with Magnesium Sulphate. Two and one-half hours postpartum, the patient suffered a sudden convulsive attack, two more followed about fifteen minutes apart. The patient was given 10 c.c. of a 25 per cent solution of magnesium sulphate subcutaneously. Three and one-half hours later a similar injection was given. No convulsive attacks occurred thereafter, and the patient was discharged well.

Von Miltner.[24] The writer reports on the intramuscular injection of magnesium sulphate, in connection with the use of luminal, but does not mention intraspinal injection.

Mittweg, Wilhelm.[25] The writer, who is a staff assistant at the school for midwives at Osnabruck, of which Rissmann is the director, reports nine cases of eclampsia and discusses the treatment recommended by the institute. He states that magnesium sulphate is sometimes used in combination with luminal in the form of a rectal, subcutaneous or intramuscular injection, but he makes no mention of intradural injections. Literature*

Rissmann.[26] New Methods of Treatment in Eclampsia Convulsions. In the author's opinion the dangers of this therapy are overrated. He discusses the comparative value of magnesium sulphate given intraspinally and the use of luminal, morphine and chloralhydrate. He regards the therapy as one to be employed in severe cases.

Rissmann.[27] Is Eclampsia Curable by Injections into the Spinal Cord? A thirty-four year old woman had twelve convulsions within thirteen hours. The last came on when the needle was in the lumbar sac. A 15 per cent solution of magnesium sulphate was used for injection. There were no more convulsions and the patient was normal three days later.

DISCUSSION

Because of their severity the above four cases were chosen for treatment with magnesium sulphate by the intrathecal route. The salt was not used until a thorough eliminative treatment had failed to control the convulsions. After each injection of magnesium sulphate the convulsions immediately ceased, and the minimum time in which convulsions were controlled was 18 hours.

One patient (Case 2) was in coma when admitted to the hospital. Her condition seemed hopeless from the beginning. She did not re-

*Schroeder, Knud: Om Behandling af Tetanus (Hospitalistidende, No. 27, 1913.)
— — : Om Behandling af Chorea minor med Sulfas magnesicus (Ugeskrift for Laeger, No. 36, 1913).
Zweifel: Döderleins Handbuch der Geburtshilfe, 1916.

gain consciousness before death. However, the magnesium sulphate controlled the convulsions.

The necropsy findings in Case 4 show that the patient had previously suffered considerable damage in several organs which probably brought about her death.

The convulsions in eclampsia are presumably of cerebral origin; but, to our knowledge, it had not been definitely established just where and how they develop.

The action of magnesium is supposed to be due to its penetration into the space between the terminal processes of the neurons (Sherington's synaptic membrane) whereby the contact is cut off.

The amount of magnesium sulphate to be used is 1 c.c. of a 25 per cent solution to each 25 pounds of weight. With larger doses of this salt the respiratory center is depressed and respirations may cease, but the heart action and pulse are unaffected. In cases of respiratory failure following an overdose of magnesium sulphate, 10 c.c. of a 25 per cent calcium chloride solution given intravenously will have a balancing action on the magnesium salts. When respiratory failure occurs, artificial respiration should be started immediately and continued until normal respirations are established.

The results obtained in the four cases we worked on have been satisfactory. We feel that this therapy should be tried in severe cases of eclampsia.

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29 PEARL STREET.

A PRELIMINARY REPORT ON THE INTRAVENOUS USE OF MAGNESIUM SULPHATE IN PUERPERAL ECLAMPSIA*

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IN MAY, 1924 one of the internes, Dr. E. Bogen, suggested the use of magnesium sulphate intravenously for the control of eclamptic convulsions. Having in mind the sedative action of magnesium sulphate on the nerve cells as reported by Meltzer and Auer in the American Journal of Physiology in 1904, as well as the intraspinal use of magnesium sulphate for the control of tetanic convulsions, we thought it worth while to give it a trial. Our experience in the few cases here reported has been so uniformly successful, that we feel it is worthy of further and more extensive trial and we are making this preliminary report in the hope that more extensive experience may bear out our impression that in the intravenous administration of magnesium sulphate, we have at our disposal a means, not only of controlling the convulsions of eclampsia, but an efficient treatment of the toxemia itself.

The treatment as developed at the Los Angeles General Hospital, consists of the intravenous administration of 20 c.c. of a 10 per cent solution of magnesium sulphate as soon after the first observed convulsion as possible. Eliminative measures, such as phlebotomy, stomach lavage, administration of castor oil, colonic flushings with glucose and soda are carried out as in the treatment of any toxemic condition. We are coming to feel more and more strongly, however, that the best results can be obtained by the least handling of the patient, consistent with obtaining the desired results.

The cases herewith reported are in most part from the obstetric services of Dr. L. G. McNeile, and of the writer, at the Los Angeles General Hospital. The cases were under the direct supervision of the resident obstetricians, Drs. L. J. Kaffesieder and H. White, to whom credit is due for the carrying out of the treatment. There are three cases included from the private practices of members of the attending staff.

We have now to report seventeen cases of eclampsia, ante-, intra-, and postpartal, which have received this treatment, with but one maternal death. It is to be remembered that these are all cases of the profoundly toxic type, having convulsions, and in coma when first seen, and most of whom have had little or no antepartal care.

*Read at the meeting of the Los Angeles Obstetric Society, Oct. 14, 1924.

CASE 1.—Hosp. No. 211825. Para i, twenty-six yrs., eight months pregnant, in almost continuous convulsions on admission. Two gr. ¼ doses of morphine sulphate given. Not in labor; Bl. Pr. 180. Given 20 c.c. of 10 per cent solution of magnesium sulphate intravenously on admission. Venesection of 500 c.c. 1000 c.c. of normal saline given by hypodermoclysis. Three hours later 10 c.c. of 10 per cent magnesium sulphate intramuscularly, 1000 c.c. of normal saline by hypodermoclysis repeated. Twelve hours after admission patient developed labor pains, and five hours later delivered a macerated eight months fetus. There was no further convulsion after the first injection of magnesium sulphate and recovery was uneventful.

CASE 2.—Hosp. No. 213762. Para i, eighteen yrs. Comatose when admitted, said to have had five convulsions at home. About 7½ months pregnant, not in labor. Bl, Pr. 150. Had one convulsion, immediately after being admitted. Twenty c.c. of 10 per cent solution of magnesium sulphate given intravenously during convulsion, which ceased immediately. Two hours later, patient was able to take orange juice by mouth. Two hours after admission, 10 c.c. of 10 per cent magnesium sulphate repeated intravenously; 1000 c.c. of normal saline by hypodermoclysis, patient conscious all the time. On admission there was a total anuria on catheterization for six hours. Fifteen hours after admission, developed a bloody vaginal discharge. On the supposition that a premature separation of placenta had occurred, membranes were ruptured artificially. One hour later 20 c.c. of 10 per cent magnesium sulphate given intravenously, because of extreme restlessness of patient. One and one-half hours later, spontaneous delivery of a stillborn premature infant. Recovery of mother uneventful. One of the attending obstetricians saw this patient on admission and considered her to be a hopeless case. This is one of the General Hospital series, in which any local obstetrical interference was carried out, and that only rupture of the membranes because of premature separation of placenta.

CASE 3.—Hosp. No. 212521. Para ii, age forty-two. Was in convulsions on admission. She was given 25 c.c. of 10 per cent magnesium sulphate intravenously. Morphine gr. ½ in ¼ gr. doses. One and a half hours later, 1000 c.c. normal saline by hypodermoclysis. Full term, not in labor. Had a similar attack 16 years ago. About 18 hours after admission, given Tr. veratrum viride, ♏ xv by hypo; this was followed by a drop in the blood pressure from 210/80 to 96/68. She was then given adrenalin, ♏ xv, which brought her blood pressure up to 112/78. Two hours later 10 c.c. of magnesium sulphate repeated, because of marked restlessness. The patient never came out of her coma, fully, and died undelivered of pulmonary edema twenty-four hours after admission and about six hours after administration of veratrum viride. There was no further convulsion after the first dose of magnesium sulphate.

This was the only death in the series, and in view of the drop in blood pressure following the veratrum, we feel that the pulmonary edema which closed the scene, was due as much to the veratrum, as to the toxemia itself.

CASE 4.—Hosp. No. 212813. Para i, age nineteen. In continuous convulsions on admission. At term, not in labor; 25 c.c. 10 per cent magnesium sulphate, followed by 1000 c.c. normal saline by hypodermoclysis. Ten hours after admission, 10 c.c. magnesium sulphate given, because of restlessness. Thirty-six hours after admission, spontaneous delivery of normal male infant. Recovery uneventful.

CASE 5.—Hosp. No. 212754. Para i, age eighteen. In convulsions on admission; at term, in labor, pains every ten minutes. Two convulsions after admission, 25 c.c. of 10 per cent magnesium sulphate intravenously, and gr. ¼ morphine sulphate by hypo. Patient continued in slow labor, and twenty-four hours after first injection had another convulsion while in 2nd stage labor. Magnesium sulphate 15 c.c.

given intravenously, and morphine sulphate gr. ¼. Four hours later, delivered spontaneously a normal infant. No obstetrical interference. Recovery uneventful.

CASE 6.—Hosp. No. 212431. Para vi, age thirty-five. In convulsions on admission. At term, not in labor; 20 c.c. of 10 per cent magnesium sulphate intravenously. Morphine sulphate gr. ¼ per hypo; 500 c.c. of blood by phlebotomy, two hours later, 1000 c.c. of saline by hypodermoclysis, and another gr. ¼ of morphine sulphate. Seven hours after admission convulsions recurred; 10 c.c. magnesium sulphate were then given intravenously, and convulsions ceased immediately, and did not recur. The following day she delivered spontaneously a 3½ pound stillborn infant. Mother's recovery uneventful.

CASE 7.—Hosp. No. 211127. Para ii, age twenty-one. Came in postpartum, in severe convulsion. Twenty c.c. of 10 per cent magnesium sulphate intravenously, given immediately, and gr. ½ morph. sulph. by hypo. Fisher's solution, 700 c.c. by proctoclysis. Patient continued to have convulsions. Two hours later, 15 c.c. of 10 per cent mag. sulph. intravenously and 700 c.c. 5 per cent glucose intravenously. Seven hours after admission patient was still having convulsions, and 15 c.c. of mag. sulph. were again given intravenously, and morph. sulph. gr. ¼ given by hypo. Phlebotomy of 500 c.c. Convulsions still continued, but about 36 hours after admission the coma began to clear, and the convulsions ceased. Forty-eight hours after admission, patient was conscious and made an uneventful and complete recovery from this time.

CASE 8.—Hosp. No. 210014. Para i, sixteen years of age. Delivered at 6 A. M., 4:30 P. M. convulsions began, recurring at frequent intervals until 6 P. M., 25 c.c. of 10 per cent mag. sulph. given intravenously; convulsions ceased immediately; 500 c.c. of 5 per cent glucose given intravenously and 1000 c.c. of normal saline by hypodermoclysis. Three hours later, 15 c.c. of mag. sulph. again given intravenously because of slight muscular twitching. No further convulsions, recovery uneventful.

CASE 9.—Hosp. No. 212332. Para ii, age nineteen. Admitted two days postpartum and in convulsions; 20 c.c. of mag. sulph. given intravenously, morph. gr. ¼ by hypo. Phlebotomy of 500 c.c. Convulsions ceased. Four hours later 500 c.c. normal saline by hypodermoclysis. Recovery uneventful.

CASE 10.—Hosp. No. 213687. Primipara, age twenty-six. Admitted Aug. 8, 1924; 5:15 P. M.; pains began 18 hours before admission, two convulsions before admission, Bl. Pr. 250. Had already been given morph. sulph. gr. ¼; 7 P. M. given 25 c.c. of 10 per cent mag. sulph. intravenously. No further convulsions. Pains began again at 2 A. M.. Delivered spontaneously of living baby at 8:15 A. M. Clear mentally after delivery. Uneventful convalescence.

CASE 11.—Hosp. No. 214722. Admitted Sept. 1, 1924, 10:50 A. M. Para i. Had ten convulsions before admission. Had been given 20 ♏ veratrum viride before admission. When admitted was in coma and had marked general edema. At 11:05 A. M. Bl. Pr. 150/120, was given 20 c.c. 10 per cent mag. sulph. intravenously. At 11:20 A. M. Bl. Pr. dropped to 80/50, probably as result of veratrum viride given before admission, adrenalin ♏x given, Bl. Pr. returned to 150/100 and some what later 130/100, where it remained all afternoon. At noon gastric lavage and colonic flushing with soda solution: 4:40 P. M. patient restless and crying; 20 c.c. of mag. sulph. repeated intravenously; patient quieted and went to sleep. 5 A. M. Sept. 2, 1924, patient awake and clear mentally; 1:30 P. M. membranes ruptured and bag inserted. Bl. Pr. 150/100. 9:30 P. M. labor started, 11:25 P. M. spontaneous delivery of living baby, convalescence uneventful.

CASE 12.—Private case of Drs. L. G. McNeile and J. Vruwink and reported by them. Para iii. Had had mild toxemias but no eclampsia in both her previous pregnancies, which ended in spontaneous deliveries of living babies. Due Nov. 11, 1924. July 29, 1924, Bl. Pr. 120/80 with edema. Treatment of toxemia began. Aug. 26, 1924, Bl. Pr. 195; patient sent to hospital. Aug. 29, beginning at 9 P. M. had three convulsions in rapid succession. 11 P. M. 25 c.c. of 10 per cent mag. sulph. intravenously. Two convulsions after injection. Aug. 30, 12:15 A. M. Art. rupture of membranes, 3:45 A. M. 25 c.c. of 10 per cent mag. sulph. following two more convulsions, 6 A. M. breech extraction of premature fetus. No further convulsions, convalescence uneventful.

CASE 13.—Seen by writer in consultation with Dr. C. W. Anderson, through whose courtesy I am permitted to include it in this series of cases. California Lutheran Hospital No. 83696. Para i, twenty-nine years of age, admitted Aug. 18, 1924, about 5½ months' pregnant, and in coma on admission at noon. Had had three convulsions prior to entrance. Bl. Pr. 174/90. At 12:45 P. M. seven ounces of urine obtained by catheter. 1:45 P. M. convulsion; 2:45 P. M. convulsion; 4:40 P. M. convulsion. 4:45 P. M. given first dose of mag. sulph. 20 c.c. of 10 per cent solution intravenously. Croton oil ♏2 on tongue; 8:30 P. M. Bl. Pr. 170; Phlebotomy of 600 c.c. 8:50 P. M. seventh and last convulsion; 9:20 P. M. 20 c.c. mag. sulph. intravenously; Aug. 19, 1924, 2:20 A. M. morph. sulph. gr. ¼. 2:50 A. M.; complains of tongue feeling sore; 6.50 A. M. talking plainly—10:30 A. M. colonic flushing, glucose 5 per cent, soda bicarb 2 per cent. 5 P. M. glucose and soda colonic flushing. Urinary output for 24 hours, 24½ ounces. Aug. 20, 1924, 8:30 A. M. glucose and soda colonic flushing, urinary output 54 ounces measured, not including considerable lost with bowel movements. Patient perfectly clear for first time since admission to hospital. Aug. 21, glucose and soda flushing at 4:30 P. M. Urinary output for 24 hours 67 ounces. From this time on patient was apparently well of her eclampsia, and *her pregnancy was undisturbed.* She had, however, toxemic symptoms, such as occasional blurring of vision, albumin in her urine, which had markedly diminished from 11 gms. per liter to what the laboratory termed a "moderately heavy trace"; her blood pressure remained high, from 145-154. In other words, she had been converted from a case of frank and severe eclampsia, into a preeclamptic toxemia. We had thought that she had a dead fetus as she had felt no movements for about ten days before onset of eclampsia, there had been no appreciable increase in size of the uterus and the fetal heart had not been heard; so we expected her to go into spontaneous premature labor. On Aug. 26, 27 and 28 the fetal heart was definitely heard and counted at 160 by the resident, and both Dr. Anderson and myself also heard the heart tones. On Aug. 31 her blood pressure rose to 170, and both Dr. A. and I felt that we would not be justified in attempting to carry her any further. So a bag was inserted to induce labor. She had no further medication, other than two doses of morph. sulph. gr. ⅙ in 2 c.c. of 50 per cent mag. sulph. as analgesics during her labor. Her delivery was not completed until Sept. 2, at 5:20 P. M., when a dead premature infant was delivered spontaneously, 55 hours after introduction of bag. At no time were there any convulsions during labor, her nervousness being controlled by hypodermics of morphine and magnesium sulphate. After her delivery, she had an uninterrupted convalescence, being discharged from the hospital on Sept. 8, 1924. She still carried albumin but other than this she was entirely well. Since her return home, Dr. A. informs me, the albumin has entirely disappeared.

I have reported this case in some detail as, to my mind, it is one of the most interesting of the cases, in that with two intravenous injections of magnesium sulphate, the eclamptic convulsions were stopped

and the patient's pregnancy was carried on for two weeks longer with a living fetus. It suggests the possibility of combating the remaining toxemic condition with intravenous magnesium sulphate treatment, which at this stage of our experience we did not feel justified in attempting. In studying her urinary output, we find that in the first twenty-four hours after the magnesium sulphate, she excreted 24½ ounces, the second twenty-four hours, over 54 ounces and the third twenty-four hours, 67 ounces. It would seem, then, that a partial kidney block was overcome by the action of magnesium sulphate.

CASE 14.—Hosp. No. 215-735. Admitted 10 A. M., Sept. 23, 1924. Primipara, age fifteen. About 8 months' pregnant, not in labor. Had five convulsions before admission. Bl. Pr. 180/160. Was in coma and had three convulsions before she was given the magnesium sulphate. 11:5 A. M. given 20 c.c. of 10 per cent magnesium sulphate intravenously; 11:10 A. M. convulsions stopped but patient was vomiting quantities of foul vomitus; gastric lavage done and three ounces of magnesium sulphate solution left in stomach. She then had four more convulsions and at 1:40 P. M. was again given 20 c.c. of 10 per cent mag. sulph. intravenously; during the afternoon she had four more convulsions. I saw the patient at 4:30 P. M., she was in deep coma, was markedly edematous and was apparently in a desperate condition. At 5:15 P. M. she had another dose of 20 c.c. of mag. sulph. intravenously and had one more convulsion after the last dose of magnesium sulphate. She went into labor at 7 P. M.; 8 P. M. membranes ruptured, and at 9:25 P. M. she was spontaneously delivered of a stillborn child. On Sept. 24, she was in a semicomatose condition all day; and at night, in a semicomatose delirium, she got out of bed; on the night of Sept. 25, she was partially rational, and on the morning of the 26 she had entirely cleared mentally. During the entire time of her coma she passed large quantities of urine, which could not be measured, as it was passed involuntarily. The edema disappeared rapidly. This patient had twelve observed convulsions within six hours and at least five before admission to hospital, in all seventeen in about nine hours; she received 60 c.c. of 10 per cent magnesium sulphate in six hours before the convulsions were controlled, and was not entirely clear mentally until about 70 hours after beginning of treatment. She received no other treatment than the magnesium sulphate and made an uneventful convalescence, being discharged from the hospital on Oct. 6.

CASE 15.—Hosp. No. 215-886. Admitted Sept. 25, 1924, 10:45 P. M. Age eighteen, primipara, delivered at 5:20 P. M., before admission to hospital. Two minutes after delivery had first convulsion, had had several more before being brought to hospital, including one convulsion in ambulance. Bl. Pr. on admission 166/92. At 11 P. M. was given 20 c.c. of magnesium sulphate intravenously. By midnight, patient quite rational. Gastric lavage done at 1:30 A. M. Sept. 26, 2 ounces magnesium sulphate by mouth; 4 A. M. colonic flushing, glucose and soda; 4:20 A. M. convulsion; 6 A. M. patient conscious, mag. sulph. solution 2 drams by mouth at 6 A. M., 11 A. M., 2 P. M. and 10 P. M. Patient cleared up rapidly, having no further convulsion. She was discharged from the hospital Sept. 29, at her own request. She had but one intravenous injection of magnesium sulphate, having had several postpartum convulsions before admission to hospital and only one convulsion after institution of the treatment. No further treatment given except magnesium sulphate by mouth.

CASE 16.—Hosp. No. 215-980. Admitted 5:15 P. M. Sept. 27, 1924. Age nineteen. Primipara. Was delivered at home at 5 A. M. Had had two convulsions before

delivery, which was a forceps delivery. She had a complete tear of the perineum into the rectum. She had had repeated convulsions all day and doctor in attendance had used three cans of ether and four ounces of chloroform in attempt to control convulsions. She had also had two hypodermic injections, presumably of morphine. Veratrum viride had likewise been given. On admission her Bl. Pr. was 60/40, there was a large quantity of mucus in her throat and she was very restless, throwing herself about the bed continuously. She was given adrenalin, ℥x and her Bl. Pr. went up to 110/60. At 5:40 P. M. 20 c.c. of 10 per cent mag. sulph. given intravenously, at 7:10 P. M. patient still very restless and 25 c.c. of mag. sulph. repeated. At 10:30 P. M. 20 c.c. of mag. sulph. Sept. 28, 1924, 1 A. M. morph. sulph. gr. ¼, by 7 A. M. she was able to take liquid by mouth and was given one and one-half ounces of magnesium sulphate in solution. She had no convulsion after admission to hospital, but recovered from her eclampsia only to develop a psychosis, which the psychiatrists call a dementia precox. She is still in the hospital under treatment for her mental condition. I think we are justified in claiming her as a recovery as far as her eclampsia is concerned. That she had had an operative delivery and other medical treatment is true, but that she survived the bombardment of operative attack, hypodermic medication and chloroform and ether anesthesia for twelve hours on top of her severe toxemia, is to my mind a tribute either to her powers of resistance or to the effectiveness of the eliminative powers of intravenous magnesium sulphate. If she recovers from her psychosis, she still will have to have a repair of her complete laceration.*

CASE 17.—Private case of Dr. J. C. Irvin and reported by him. Age twenty-six, para ii. Had had eight eclamptic convulsions with her first pregnancy. At that time she was delivered by vaginal hysterotomy. During her second pregnancy she was kept on a protein-free diet from the third month by her family physician. At 8½ months she began having severe headaches and blurring of vision. Eye examination revealed no changes in fundus. The following day she had a convulsion about 1 P. M. Bl. Pr. 160/90, convulsions at 3, 4, and 6 P. M. Patient seen by Dr. Irvin at 8 P. M. and she was given 2 c.c. of 50 per cent solution of magnesium sulphate intravenously. Patient quieted very much after first dose of magnesium sulphate and had no further convulsions. She was given a second dose of 2 c.c. one hour later. At 11 P. M. a classical section with sterilization was done. Twelve hours after operation patient was entirely rational and in good condition. An uninterrupted recovery was made.

In this case, the magnesium sulphate was used in much greater concentration than we have been using it, but the quantity of the drug per dose was only one-half of what we had been using. The section, I presume, was done because the patient was near term, not in labor, with a long cervix, and had already been subjected to a vaginal section, and also because of the desirability of sterilizing such a patient.

SUMMARY OF CASES

There have been eleven antepartal cases, one intrapartal and five postpartal. Of the ante- and intrapartal cases, one died undelivered; in one, membranes were ruptured artificially, with spontaneous delivery of baby; in one, at term, membranes were ruptured and bag inserted to induce labor, delivery completed spontaneously; in one, a six months' pregnancy, labor was induced by the bag after recovery from eclampsia, with spontaneous delivery of fetus; in one, a clas-

*This woman finally recovered completely from her psychosis.

sical section was done after convulsions were controlled; and in seven, spontaneous delivery without any obstetric interference.

As to the convulsions, ten were in convulsions on admission, with number of attacks unknown, one had had two convulsions; one had had three, one had had four, two had had six, one had had eight, and one had had ten convulsions before the treatment was instituted. Ten had no further convulsion after the first intravenous injection, four had one convulsion after first injection; one had two convulsions after first injection and two after second; one had four after first, four after second and one after third injection, this patient having had seventeen known convulsions before they were controlled. Three patients had but one intravenous injection of 20 c.c., 25 c.c. and 20 c.c. respectively; eight had two injections of 20 and 10 c.c.; 25 and 10 c.c.; 25 and 10 c.c.; 25 and 15 c.c.; 25 and 15 c.c; 20 and 20 c.c.; 25 and 25 c.c.; 20 and 20 c.c.; of 10 per cent solution respectively; one had two injections of 2 c.c. of 50 per cent solution; and five had three injections of 20, 10 and 20 c.c.; 20, 10 and 10 c.c.; 20, 15 and 15 c.c.; 20, 20 and 20 c.c.; and 20, 25 and 20 c.c. of 10 per cent solution respectively. Of the eleven babies which were delivered after treatment was instituted, there were five living, one full term stillborn and five premature stillborn. It will be noted that the first cases were given considerable other treatment, such as phlebotomy, saline infusion, colon flushings, etc., while the later cases, Nos. 10 to 17, had very little other treatment and were disturbed as little as possible. None of these had any hypodermoclysis and very little morphine was used in these later cases. This makes seventeen cases, with one maternal death (Case 3), a mortality of 5.88 per cent.

After this paper was completed, Dr. E. Bogen called my attention to the records of the first three cases in which magnesium sulphate had been given intravenously, hospital Nos. 207157, 209677, and 210014, which had been overlooked. Of these, two made good recoveries and one died. The one who died, the second one to receive magnesium sulphate, came in, in convulsions, and there were three convulsions before she had the magnesium sulphate; the first dose being 30 c.c. of a 3 per cent solution; nine hours later she received a second intravenous injection, this time of 20 c.c.; she was in very bad condition, her pulse varying from 136 to 160 and irregular for several hours; three-quarters of an hour after her last injection, a Scanzoni forceps delivery was done, a dead baby being delivered. Five hours after the delivery, patient had not come out of her coma, had another convulsion and died. This patient did not receive enough of the magnesium sulphate and in addition a difficult forceps extraction was done, at the height of her toxemia.

One of the others had had five convulsions before admission, and two convulsions in the ward before first injection of magnesium sul-

phate, no further convulsions. A bag was inserted to induce labor and twelve hours later she had a spontaneous delivery of a stillborn child. Uneventful recovery.

The third one had her first convulsion fourteen hours after a spontaneous delivery of a living child. She had three severe convulsions within an hour and then continuously. Her first dose of magnesium sulphate was 30 c.c. of a 7 per cent solution. She had no further convulsion, but fifteen hours later, she was given another injection of 15 c.c. of a 6 per cent solution because of muscular twitching.

We do not feel that these cases should be included as they did not receive the proper dosage and the treatment was not carried out as it has since been developed. Especially is this true of the fatal case which did not have the dosage now used, and which was *operated on at the height of her toxemia.* If we include these cases, however, there are twenty cases with a mortality of 10 per cent. The last fourteen *consecutive* cases were without mortality.

We have made a careful search of the literature in an attempt to learn if there has been any previous use of magnesium sulphate intravenously in eclampsia and also to find a logical explanation of its action. The only reference we have been able to find is an article on "Diagnosis, Prognosis and Treatment in Nephritis" by Fisher, published in the *Detroit Medical Journal,* June, 1916. In this article, he discusses the case of a patient who had a postpartum eclampsia. Fisher says, "The administration of sodium bicarbonate and of magnesium sulphate in several small doses represented a first attempt to meet the edema of her brain, that of the kidneys as expressed in her urine, and that of her tissues generally, as observed in her slight general edema." Not succeeding completely, after trying several other measures, he finally gave her intravenously, 250 c.c. of a 2 per cent solution of magnesium sulphate; this was repeated twelve hours later as "she again became drowsy and complained of headache and nausea. This was an indication to us that her brain swelling was again increasing, so a second dose of magnesium sulphate was given as before." While this observation is the basis of our work, the method of administration is very different. To take one-half hour to make an injection of 250 c.c. is feasible in a patient who is drowsy or comatose, but to do the same thing to a patient having severe convulsions in rapid succession would be rather difficult. The method as developed at the General Hospital of giving 15 to 25 c.c. of a 10 per cent solution, is very readily done in the period of relaxation immediately following a convulsion.

As stated in the beginning, our first idea was to control the convulsions by the paralyzant or sedative effect on the voluntary muscles. We were at first concerned as to whether we might not get a respiratory paralysis, but have not noted *any* deleterious effect in any of the

cases. I also believe that we get a depletant effect by withdrawing of fluids from the tissues into the blood stream, thus reducing the edema. In reducing the edema of the brain the coma clears up more rapidly and the increase of the watery elements of the blood increases the urinary output and relieves the patient of her toxins. Our results in this small series of cases have been so uniformly good that we feel that in the intravenous use of magnesium sulphate we have a method of treatment which yields results far better than any we have made use of heretofore. Our previous mortality in this class of severe eclamptics had been about 30 per cent, while in this series it was 5.8 per cent.

Without attempting to discuss the causes of eclampsia, I believe that the urgent indications for treatment are fairly definite, (1) to antidote as effectively as possible the effect of the toxins on the central nervous system; (2) to stimulate elimination of the toxins. Does the intravenous use of magnesium sulphate fulfill these indications? I believe it does.

As to its effect on the convulsions—in no case have we been unable to control the convulsions, apparently the only question being to get sufficient of the drug into the circulation to accomplish this end. This we have been able to do without any of the deleterious effects which some of the early investigators feared. In seeking an explanation of this anticonvulsive effect of the magnesium sulphate we find a considerable literature has been developed since Meltzer and Auer's original experiments were published in the *American Journal of Physiology*, October, 1905, and the *Medical Record* of Dec. 16, 1905 (quoted by Blake, *Surg. Gyn. and Obstet.*, 1906, ii, p. 541). As a result of his experiment, Meltzer concluded that "the action of the magnesium salts is distinctly inhibitory and also selective for nervous tissue." Blake, after quoting the above results of Meltzer's work, reports on the use of magnesium sulphate in production of anesthesia for surgical operations and also in the treatment of tetanus (intraspinally).

In regard to the tetanus, Blake claims "(1) A marked effect in restraining the convulsions and relieving pain, thereby conserving strength and preventing excessive metabolism and heat production. (2) That spasm of muscles of mastication and deglutition is at least lessened, thereby permitting feeding. (3) That its action is continued for a considerable period, (29 to 34 hours), without depressing action on the heart muscle; and finally, in one case at least, that repeated injections produced no harmful effect, except the inhibition of the bladder and the consequent need for catheterization." (Intraspinal use.) In the *Journal of the Am. Med. Assn.* for Oct. 14, 1916, Peck and Meltzer report on the intravenous use of magnesium sulphate for the production of anesthesia, and conclude, "The employment of intravenous injections of magnesium salt as an anesthetic may prove to be indeed a practicable and advantageous method, be-

cause, in the first place, it may cause simultaneously a *moderate relaxation of the muscular mechanism,* and secondly, because the untoward effects can be rapidly reversed by a careful administration of a solution of calcium chloride." In our work we were prepared with a solution of calcium chloride to combat any respiratory paralysis, but as already noted, fortunately, did not observe the slightest respiratory embarrassment in any of the cases.

In the *American Journal of the Medical Sciences* for March, 1923, Weston and Howard, basing their work on the reports of Meltzer and Auer, report on their use of magnesium sulphate as a sedative in excited states. They found that "In 82.7 per cent of the cases, the sedative action was prompt, the patient becoming quiet after fifteen or thirty minutes and sleeping from five to seven hours. In a few instances the patient became quiet but did not sleep. The effect persisted for from five to ten hours."

Without going any further into the extensive literature which has developed in this subject since Meltzer and Auer's original work I believe the above-quoted reports furnish an explanation of the anticonvulsive and sedative action of magnesium sulphate. As to the second therapeutic indication, viz.: elimination of the toxins, the only explanation of this action we have been able to find in the literature is in the article by Fisher, already referred to, in which he explains its therapeutic effect in this respect.

The coma usually clears comparatively rapidly, although in some of the cases it was forty-eight to seventy-two hours before the patients were entirely clear. I believe this comparatively rapid clearing-up of the coma to be due to a reduction of the edema in the brain. By the increase in the watery constituents of the blood, diuresis is increased and toxins eliminated. In other words, the magnesium sulphate in the blood stream, in addition to its anticonvulsive and sedative action, acts as it does in the bowel, namely, to withdraw tissue fluids, and instead of watery bowel movements, we have increased diuresis. This impression I have gained in particular from Case 13, in which, after the second injection of magnesium sulphate, the convulsions ceased, the coma gradually cleared; and the urinary output was 24½ ounces the first twenty-four hours, over 54 ounces the second twenty-four hours and upwards of 67 ounces the third twenty-four hours, without any considerable increase in fluid intake, and *with rapid diminution of the visible edema.* This, with the pregnancy uninterrupted.

The study of the other cases, in this particular, was not so significant, as they were all either postpartal or the delivery was completed within a short time after the treatment was begun.

As a result of our experience in this series of cases I have become more firmly convinced in my belief, which has been growing stronger

in the last few years, that eclampsia is essentially a medical complication of pregnancy and as such should be treated medically. On our services the pregnancy is not interfered with during the treatment of the eclampsia, except for some urgent obstetric indication. It has not been necessary to interfere with any of the cases, except the one with eclampsia at 5½ months and labor was induced only after the active eclampsia was entirely overcome, though the toxemic condition still existed.

From our experience, I am disposed to try the intravenous use of magnesium sulphate in cases of preeclamptic toxemia which do not improve under the usual treatment, in the hope that the toxemia can be controlled and the pregnancy carried to spontaneous labor without the supervention of an eclamptic attack. There has been observed no effect on the labor, either of hastening its onset or of interfering with its progress after it starts.

CONCLUSIONS

(1) By the intravenous use of magnesium sulphate the convulsions of eclampsia can be controlled and the coma cleared by a sufficient dosage.

(2) The intravenous use of magnesium sulphate reduces edema and promotes diuresis, thus eliminating the toxins.

(3) Other eliminative measures, such as catharsis, phlebotomy, lavage, and colonic flushings may be used as adjuvants; however, as our confidence in the magnesium sulphate has increased, we have gradually reduced this supplementary treatment until, in the last two cases, little else was done.

(4) Surgical interference with the pregnancy should not be undertaken during the eclamptic attack, except for the most urgent obstetric indication.

My acknowledgment and thanks are due Dr. L. G. McNeile for the courtesy of being permitted to include cases from his service in this report; to my associates on the attending obstetric staff of the Los Angeles General Hospital for their cooperation in the work; to Drs. L. I. Kaffesieder and H. White, resident obstetricians, for their close supervision of the cases, and to my own associate, Dr. G. B. Greenbaum, for assistance in searching the literature.

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COMPARISON OF THE RESULTS OBTAINED AFTER RADICAL AND CONSERVATIVE TREATMENT OF ECLAMPSIA IN THE OBSTETRICAL DEPARTMENT OF THE JOHNS HOPKINS HOSPITAL

By Karl M. Wilson, M.D., Baltimore, Md.

UNTIL the exact etiology of eclampsia is known, the treatment of patients suffering from it must necessarily be more or less empirical. The methods proposed for the treatment of this disease can be divided into one of two main groups: (1) Procedures in which immediately delivery of the woman is the object to be attained, and (2), those which aim rather at the control of the convulsions, delivery being a secondary consideration. In the latter group methods of treatment are encountered which would appear to be diametrically opposed; (compare for example the method of Stroganoff with the "Dublin" method), yet the advocates of each claim equally good results.

While in certain quarters the immediate termination of pregnancy, by radical surgical procedures if necessary, is still advocated; on the whole the tendency at present tends to follow more conservative lines.

Since the opening of the Obstetrical Clinic of the Johns Hopkins Hospital in 1894, to July, 1924, two hundred and forty-seven cases of eclampsia have been treated in the service, which may be readily divided into two groups, according to the lines of treatment followed. The first series includes those treated in the clinic from its opening until the year 1912, and comprises one hundred and ten cases. Of these sixty-one were of the antepartum, twenty-four of the intrapartum, and twenty-five of the postpartum varieties. In this series there were twenty-five maternal deaths, as follows: fifteen in the antepartum cases, six in the intrapartum cases and four deaths in the postpartum cases; a mortality of 24.6, 25 and 16 per cent respectively; while the gross maternal mortality for this series was 22.7 per cent.

In the treatment of the ante- and intrapartum cases in this series, the prime object in view was immediate delivery, following which other procedures such as sweating, purging, venesection, administration of sedatives, and administration of large amounts of fluid were made use of according to the condition of the patient. Immediate delivery, however, was the first consideration, the choice of procedure depending largely on the condition of the cervix. In the antepartum cases particularly, this involves the performance of numerous major obstetrical operations. In the earlier years, accouchement forcé with

instrumental and manual dilatation of the cervix followed by high forceps or version was the procedure usually employed. Later, the vaginal hysterotomy of Dührssen was employed extensively, and abdominal cesarean section to some extent. Some idea of the consistency of our procedure may be gained from the fact that only two of the 85 patients in this series presenting ante- and intrapartum eclampsia were delivered spontaneously.

Table I shows the division of the cases and the results obtained in the first series.

TABLE I

FIRST SERIES

	NO. OF CASES	MATERNAL DEATHS	PER CENT	
Antepartum	61	15	24.6	21 deaths or 24.8 per cent
Intrapartum	24	6	25	
Postpartum	25	4	16	
Total	110	25	22.7	

The treatment followed in this series of cases was in general similar to that employed in most clinics at that period, and the end-results here, as well as elsewhere, left much to be desired.

In 1912 Lichtenstein reported a series of four hundred cases of eclampsia treated in Zweifel's Clinic, showing a gross maternal mortality of 18.5 per cent and in which the mortality of the antepartum, intrapartum and postpartum cases was 28.57 per cent, 12.6 per cent and 27.14 per cent respectively.

In the majority of the cases of ante- and intrapartum eclampsia, operative delivery of some type was carried out after a varying number of convulsions. On analyzing the results obtained, Lichtenstein found that in general the patients who did well were those who had lost considerable blood at the time of delivery, and he therefore argued that any benefit derived from operative delivery was in all probability dependent upon the loss of blood. Again, inasmuch as the mortality in the postpartum variety was 27.14 per cent, he very plausibly inquires why these results should be so poor if early delivery has any favorable effect on the prognosis, as in these cases one has the earliest possible delivery; that is before the outbreak of the attack. He was inclined to attribute such results as being due to the fact that the majority of the women had been delivered spontaneously and consequently had lost but a minimal amount of blood. Consequently, he concluded that equally good, or better, results should follow venesection without the addition of any serious operative procedure, and prompt improvement was noted in Zweifel's Clinic following the introduction of more conservative treatment.

Lichtenstein's arguments appeared so convincing, and our own re-

sults up to this time had been so unsatisfactory that it was decided to abandon the radical treatment of the ante- and intrapartum cases, and in future to rely upon more conservative procedures, more particularly free venesection.

Since 1912, one hundred and thirty-seven cases of eclampsia have been treated in the clinic along more conservative lines with a most pronounced improvement in the maternal results as shown in Table II. In other words, the gross maternal mortality has been reduced one-half.

TABLE II

SECOND SERIES

	NO. OF CASES	MATERNAL DEATHS	PER CENT	
Antepartum	71	9	12.6	14 deaths or 12.8 per cent
Intrapartum	38	5	13.1	
Postpartum	28	5	17.8	
Total	137	19	13.8	

During this time numerous changes have been made in the treatment followed, particularly in the transition period following the change from active and radical to conservative treatment. Operative procedures aiming at delivery were not suddenly abandoned but have become less and less frequent, so that at the present time we feel that anything in the way of a major operation is seldom indicated except in the presence of actual dystocia.

Whereas in the first series only two of the eighty-five patients suffering from ante- or intrapartum eclampsia were delivered spontaneously, in the second series, spontaneous labor occurred in forty-seven cases or 43.1 per cent, while operative interference was limited almost entirely to low forceps or version and extraction after spontaneous dilatation of the cervix had occurred. Moreover, the types of operative procedure employed vary markedly in the two series, and while accouchement forcé, vaginal hysterotomy or cesarean section was employed in 79 per cent of the cases in the first series, only sixteen or 14.6 per cent of the patients in the second series were subjected to such procedures, and in the past seven years only two major operations were performed on eclamptic patients, one being a cesarean section on account of a generally contracted pelvis.

In the curative treatment of the patients in the second series, free venesection has been the most important feature. The amount of blood withdrawn has varied, according to the reaction of the patient. Most of the patients withstand the withdrawal of considerable quantities of blood without showing any alarming symptoms. While in general 500 to 700 c.c. of blood have been withdrawn, we have not hesitated to take as much as 1000 c.c. if the patient reacted well. On the other

hand, occasionally we have been obliged to discontinue the procedure after withdrawing as little as 200 to 300 c.c.

Morphia, either alone, according to the method advocated by McPherson, or morphia combined with venesection has also been made use of to a considerable extent.

As a result of our experience during the past twelve years we have become more and more conservative, and for the past two years patients suffering from ante- or intrapartum eclampsia have been subjected to the following regime:

1. They are placed in a quiet, darkened room and are disturbed as little as possible.

2. A hypodermic injection of ¼ gr. of morphia is given at once. This may be repeated if indicated (particularly in the presence of undue restlessness or repeated convulsions) but not more than one-half grain is given in the first twenty-four hours.

3. The patient is kept turned on one side with the foot of the bed elevated as long as coma persists. Mucus is swabbed from the pharynx as it collects.

4. Venesection after the second convulsion performed under nitrous oxide anesthesia if necessary. One thousand c.c. of blood are withdrawn unless the systolic blood pressure falls below 100 mm. or the pulse rate shows alarming change during the process. (This is of course contraindicated in the presence of marked anemia.)

5. Water is given freely, as desired, when conscious. Those who cannot drink, on account of coma, are given 500 c.c. of 5 per cent glucose solution intravenously, which may be repeated in twelve hours.

6. A special nurse is in constant attendance until the patient is permanently out of coma.

7. No attempt is made at delivery until the cervix is fully dilated, unless some definite maternal indication apart from the eclamptic condition is present.

The treatment of postpartum eclampsia is identical with the above, except that the amount of blood withdrawn at venesection should represent the difference between the amount of blood lost at the time of labor and 1000 c.c.

At the British Congress of Obstetrics and Gynecology of 1922, Thomas Watts Eden suggested that the results of treatment varied greatly according to the severity of the disease and laid down the following criteria for differentiating between the mild and severe cases: (a) Persistent coma. (b) A pulse rate over 120. (c) A temperature above 103° F. (d) Convulsions numbering more than ten. (e) A urine which solidifies on boiling. (f) Absence of edema.

If any two or more of the above symptoms are present the case is

classified as severe; and as mild when none or only one of them is present.

Analysis of our two series of cases upon this basis shows a number of points of considerable interest, particularly from the standpoint of therapy.

In the following tabulations patients with chronic renal disease attended by uremic convulsions have been excluded as far as possible. Also, as the amount of albumin has been determined quantitatively in all our patients, I have chosen the figure of 10 grams per liter instead of (e) above.

Tables III, IV and V, show the results obtained in our mild and severe cases in each variety of eclampsia.

TABLE III

ANTEPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	33	5	15.1	28	10	35.7
Second series	23	0	0	48	9	18.7

TABLE IV

INTRAPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	16	2	12.5	8	4	50
Second series	19	1	5.2	19	4	21

TABLE V

POSTPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	15	0	0	10	4	40.
Second series	16	0	0	12	5	41.6

Or if we tabulate the gross figures for the three types of eclampsia occurring in the second series:

TABLE VI

SECOND SERIES

	NO. OF CASES	MATERNAL DEATHS	PER CENT	
Antepartum	71	9	12.6	14 deaths or 12.8 per cent
Intrapartum	38	5	13.1	
Postpartum	28	5	17.8	
	137	19	13.8	

A perusal of these tables at once reveals the fact that a striking improvement has been brought about in the results obtained in ante-

or intrapartum eclampsia when the two series of cases are compared. I can say very little in regard to the postpartum variety, as the results in the two series are practically identical, and the line of treatment employed in the two series was similar. It would seem that where postpartum eclampsia is of a mild type, the end-results are in general satisfactory, whereas, if it be of the severe type it is an even more serious complication than the severe form of the disease occurring prior to delivery.

If we now compare more fully the end-results obtained in the ante- and intrapartum cases in the two series, we shall see how marked the improvement has been.

TABLE VII

ANTE- AND INTRAPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	49	7	14.2	36	14	38.8
Second series	42	1	2.3	67	13	19.4

From the above figures it is seen that under conservative treatment maternal mortality in the mild cases has been reduced from 14.2 per cent to 2.3 per cent, while that of the severe cases has undergone a reduction of 50 per cent.

Notwithstanding this striking diminution in mortality, it should be noted that in the second series of cases five of the women died undelivered. Even when this is considered, the only conclusion that can be drawn from the results is that radical operative treatment not only does no good so far as influencing the disease is concerned, but actually does considerable harm. Further evidence in confirmation of this is afforded by considering the high mortality in the severe postpartum cases, and yet in them delivery had occurred before the onset of the eclamptic seizures.

Furthermore, the cases of so-called intercurrent eclampsia are also of interest in this respect. In twelve women in our second series of antepartum eclampsia, the disease yielded to conservative treatment, yet delivery did not occur until from one till twenty-two days after the cessation of convulsions. That such recovery prior to delivery does not necessarily depend upon the death of the child is evidenced by the fact that five of the twelve women gave birth to living children.

From the maternal standpoint then, our results indicate clearly that immediate delivery of the eclamptic woman by a radical operative procedure is unnecessary in the mild and inadvisable in the severe type of case, and that such treatment definitely increases the maternal mortality in both types of the disease.

The only remaining argument in favor of immediate delivery would be afforded by the fact that it leads to a marked improvement in the

fetal results. That, however, has not been our experience, and while conservative treatment does not improve the chances for the child, yet they are not materially diminished thereby. The fetal mortality will of course always be higher in the antepartum than in the intrapartum variety, as in many cases the child has not yet arrived at the period of viability.

TABLE VIII

FETAL MORTALITY

	FIRST SERIES			SECOND SERIES		
	CASES	FETAL DEATHS	PER CENT	CASES	FETAL DEATHS	PER CENT
Antepartum	61	40	65.5	71	49	69.0
Intrapartum	24	9	37.5	38	15	39.4
Total	85	49	57.6	109	64	58.7

(The above figures for fetal mortality include all stillbirths and infants born alive but dying within the first two weeks, as well as the children of women who died undelivered.)

The severity of the disease distinctly influences the fetal mortality. In the two series combined, a gross fetal mortality of 77.6 per cent was noted in the severe antepartum as compared with 53.5 per cent in the mild cases; while the severe and mild intrapartum cases showed a gross fetal mortality of 51.4 per cent and 28.5 per cent respectively. As noted above, however, this was not appreciably affected one way or the other by the method of treatment.

From a study of these two series of cases treated along totally different lines we feel convinced that radical operative procedures should have no further place in the treatment of frank eclampsia, but that the last word in its treatment has not been spoken and obviously cannot be until the etiology of the disease is definitely established.

The treatment at present employed in the Johns Hopkins Hospital presents certain features of several well-known methods. It is to be regarded as purely tentative, and will be modified whenever increasing knowledge shall provide other therapeutic measures of greater promise.

In discussing end-results we agree with Eden that it is most important to distinguish between the mild and severe types of the disease; as the great majority of the former will recover with a minimal amount of treatment. For example, in our second series of cases there were nine patients who literally received nothing in the way of treatment, and yet were delivered spontaneously and made satisfactory recoveries. Had these patients been delivered by cesarean section, for example, barring surgical risks, the results would have been the same, and might well have been employed as a strong argument in favor of that procedure.

The end-results in the severe type of case still leave much to be desired, although those treated by conservative methods show a

marked improvement (50 per cent) over those treated by the radical method.

It might be well to discuss briefly a few of the procedures which have enjoyed a certain degree of popularity in the treatment of this disease, which as a result of our experience, we have either found useless or actually harmful.

Chloroform has been used extensively to control the convulsions. As a matter of practical fact it seldom can be administered in such a manner as to produce this effect, and its damaging effect on the liver is now well known.

The sweat bath also falls in the class of dangerous therapeutic agencies, and in the past a number of our patients so treated have shown alarming symptoms following its use We feel that any advantages which might attend its use are more than offset by the dangers inherent to its use. Patients should be kept warm, but this can be done more satisfactorily with blankets and hot water bottles.

Particularly in the case of markedly edematous patients, large amounts of fluid should not be forced, as was formerly done, as the processes of elimination are unable to cope with the fluid already present.

Of operative procedures, I would particularly mention casarean section. It is the physician who sees only a few cases of eclampsia who is particularly prone to employ it. Doubtless he may have perfectly satisfactory results in several successive cases, but in a large series of cases the end-results are poor.

Peterson reports a gross maternal mortality of 25.79 per cent, while in the series of cases reported at the British Congress of Obstetrics and Gynecology in 1922, there was a gross mortality of 23.8 per cent; or if only the severe cases are considered 43.2 per cent. These results are greatly inferior to those obtained under medical treatment. It is true that the fetal mortality is somewhat lower after abdominal section, but not enough so to justify the added risk to which the mother is subjected.

In our cases where cesarean section was employed, the fetal mortality was 40 per cent. Consequently, our feeling is that cesarean section in eclamptic women should be limited to those cases in which actual mechanical disproportion exists.

CONCLUSIONS

1. The end-results in the treatment of ante- and intrapartum eclampsia are twice as good under conservative as under radical treatment. Those cases do best which are subjected to a minimal amount of obstetric interference.

2. At the present time we feel that chief reliance is to be placed on free venesection combined with the use of morphia in moderate doses.

3. The performance of cesarean section as a routine procedure in the treatment of eclampsia is to be discouraged.

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JOHNS HOPKINS HOSPITAL.

FURTHER STUDIES OF RECURRENT TOXEMIA OF PREGNANCY*

BY FOSTER S. KELLOGG, M.D., BOSTON, MASS.

ONE year ago, in a paper written for this society, I applied the term "recurrent toxemia of pregnancy" to cases in which in two or more pregnancies, symptoms of marked toxemia develop but in which it is impossible, between pregnancies, by all medical means at our disposal, to make a diagnosis of chronic nephritis or kidney insufficiency.

These conclusions were tentatively drawn:

1. That recurrent toxemia of pregnancy is a clinical entity distinct from pregnancy, complicating chronic nephritis and different from the single acute toxemia of pregnancy.

2. That whereas further investigation may show that this group consists of patients who have a faulty kidney balance, that is, a balance which allows them to live without kidney manifestations when not pregnant, but, when the load of pregnancy is added, develop kidney insufficiency, we are not in a position at present to say that this is true.

3. That this group of recurrent toxemia of pregnancy may be subdivided judging by results, into two classes—(a) that in which the prognosis under the strictest possible prenatal care is good for both mother and child, and (b) that in which the prognosis for the child is bad, no matter what prenatal care is carried out. This division is not sufficiently recognized even by those who feel that the above grouping is clinically correct, and it is on this point I would lay especial emphasis because it is of tremendous importance to certain individuals that in spite of previous failures to obtain a living child they can be taken through pregnancy and a living child secured.

*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

It was further concluded that for a time we would study all private and Boston Lying-In Hospital "toxemic-chronic nephritic group" cases under a special index and by a routine study (the details of which were included in this preliminary paper) attempting to index each case under one of the three headings, i.e., acute toxemia, recurrent toxemia of pregnancy, pregnancy complicating chronic nephritis. It is on this year's study I wish to report.

Before proceeding to actual results of this work it seems wise to state briefly the observations and thoughts which led to the conclusions enumerated above.

1. From study of 400 "toxemic-chronic nephritic group" cases from the Boston Lying-In Hospital, records and forty odd private cases in the same group, I became convinced that (a) we often did not know whether we were treating an acute toxemia or a chronic nephritis, and that patients suffered from this ignorance; that (b) acute toxemia apparently occasionally repeated itself in another pregnancy; that (c) the condition ablatio placentae usually associated in our minds with toxemia or nephritis seemed occasionally to repeat itself in cases in which there was no interval evidence of nephritis; that (d) convulsions were not a necessary part of eclampsia; that (e) chronic nephrities in pregnancy more often have convulsions than we were accustomed to think.

2. From study of the literature and my own experience I became convinced that the likelihood of being able to differentiate between so-called "nephritic-toxemia" or kidney of pregnancy and so-called "preeclamptic toxemia" is so slight in the majority of cases as to be a useless distinction, and to more than agree with Kosmak when he says, "most cases are better labeled by the latter term." I came to feel all cases should be called "preeclamptic toxemia" or as we say "toxemia of pregnancy without convulsions."

3. We, my medical associate and myself, became convinced from observation that there was no profit in babies, and distinct loss of function and some loss of life in mothers, in attempting to carry true chronic nephritics through pregnancy, after one good trial. Thus we became keen to get such cases sorted out and on the records for sterilization in the event of repeated pregnancies.

4. One belief about which we argued was that this recurrent group were "concealed chronic nephritics," and that many of these patients, if they lived long enough, would ultimately disclose chronic nephritis. The follow-up work on acute toxemias with and without convulsions published by John W. Harris in a paper entitled "The After-Effects of the Late Toxemias of Pregnancy" (Bulletin of the Johns Hopkins Hospital, Baltimore, April, 1924, xxv, 398) shows that this is undoubtedly true in many instances although his results do not

exactly correspond with ours in this aspect so far as we have gone. His conclusions were:

"1. While no recurrences of eclampsia occurred in our series, the fact that three of the twenty-seven eclamptic patients who were seen one year later showed evidences of chronic nephritis, indicates that the danger of permanent renal damage following eclampsia is not to be disregarded.

"2. The danger of chronic nephritis following preeclamptic toxemia is unexpectedly great, as shown by the fact that 60 per cent of our patients whose pregnancies were complicated by preeclamptic toxemia showed evidences of chronic renal disease when examined one year later.

"3. We are unable to differentiate between the cases of preeclamptic toxemia which will be followed by chronic nephritis and those which will not result in permanent renal injury. It is possible that the duration of the symptoms of the toxemia before delivery may be an important factor.

"4. If, in supposed cases of preeclamptic toxemia, the evidences of the toxemia persist for three weeks or more after delivery, the presumption is that the underlying disease is renal in origin."

These conclusions are interesting but to our reasoning show, not that the risk of chronic nephritic is greater after toxemia without convulsions than after toxemia with convulsions, which seems illogical, but that many chronic nephritics first demonstrate themselves in pregnancy, and that the convulsion rate is higher in acute toxemia than in pregnancy complicating chronic nephritis. We are forced to argue, by what seems obvious logic, that the "three toxemias with convulsions" and the 60 per cent of "toxemias without convulsions," who had evidence of chronic nephritis one year later, represent, or at any rate include, a chronic nephritic group from the beginning, not resulting primarily from their toxemia, but from a latent kidney insufficiency; and that the twenty-four toxemias with convulsions, and the 40 per cent of toxemias without convulsions, who showed no evidence of renal disease one year later, represent, or at any rate include, an acute toxemia group; and that the figures three to twenty-four represent roughly the ratio of convulsions between the chronic nephritic group and the acute toxemic group. This figure about corresponds to our impression of what it has been in our experience. This study at all events does not mitigate against the integrity of the recurrent toxemia theory, first, because Harris' cases show elevated blood pressure and albuminuria between pregnancies, and second, because of our last observation, namely,

5. By autopsies (detailed in the preliminary paper) we proved (to our satisfaction at least) that recurrent toxemia of pregnancy exists

as a separate entity. Briefly, the most striking case was a woman who had from 1918 to 1923, four pregnancies marked by toxemic symptoms, and diagnosed and treated as chronic nephritis—although at two months in her third pregnancy her blood pressure was 120 and her urine negative. She died with a separated placenta and without convulsions in her fourth pregnancy, and at autopsy showed *acute* hemorrhagic and necrotizing hepatitis, and *acute* diffuse nephritis; in other words, the pathologic picture of toxemia of pregnancy and not of chronic nephritis.

Three autopsies seen lately this year bring out this distinction clearly. The first showed acute nephritis,—liver normal; the second, acute hepatitis and chronic nephritis; the third, acute hepatitis and acute nephritis, in a primipara.

Having now laid before you the observations and ideas that made a study under the three headings seem worth while, we can proceed to report the results of this study.

From the Boston Lying-In records we have a series of seventy-eight "toxemic-nephritic group" patients studied. From the private records we have forty-nine cases studied in seventy-four pregnancies. The material then totals 127 cases.

Under the suggested division of acute toxemias, recurrent toxemias, chronic nephritics, we have the following results.

HOSPITAL SERIES

78 CASES

Acute toxemias	64	80%
Recurrent toxemias	7	9%
Chronic nephritics	4	5%
Acute toxemia and Chronic nephritic (autopsy)	1	5%
Doubtful	2	
	78	99%

PRIVATE SERIES

49 CASES IN 74 PREGNANCIES

Acute toxemias	24	50%
Recurrent toxemias	10	20%
Chronic nephritics	8	15%
Doubtful	7	15%
	49	100%

The discrepancy in the two series so far as the relative frequency of acute toxemia and chronic nephritis, is obviously due to the fact, as shown by the previously quoted paper of John W. Harris, that the hospital series being only a little over a year old, and many of the cases primiparas, many of the cases thrown into the acute toxemia column for lack of interval study will ultimately go into the

chronic nephritic column. The private series dates back so much longer that it is without doubt more nearly accurate.

The same argument applies to the difference in the percentage of recurrent toxemias, 20 per cent in the private against 9 per cent in the hospital series. Both series are still too short to set a percentage figure for recurrent toxemia—probably somewhere between 10 per cent and 20 per cent will be correct. But the point I wish to emphasize at this time is this: of 127 "toxemic-nephritic group" cases studied from this angle, seventeen, about 14 per cent, apparently fall under the head of recurrent toxemia of pregnancy under its present strict definition.

From the hospital series we cannot demonstrate as yet the clinical value of this grouping beyond stating that we have laid the groundwork so that on the future appearance of these cases the visiting obstetrician will have at his command definite data from a previous pregnancy and interval study on which to base his decisions.

From the short private series we can indicate what results we may hope to obtain from indexing these cases as outlined, and on this diagnosis basing our decision for or against carrying on with a given pregnancy. (The special prenatal care for the recurrent group is detailed in the first paper.)

Analyzed, these ten recurrent toxemia cases give the following results:

CASE No. 79.—No babies after five pregnancies. We have never been able to control this patient and still feel that she might go to term if she did as ordered, since her most recent pregnancy went to nearly six months.

CASE No. 134.—Two live babies for which we can take no credit in this aspect—but we can advise against further pregnancies.

CASE No. 268.—Two live babies normally delivered at term, without signs of toxemia in the mother, after two accouchements forcés for "toxemia of pregnancy," and one six months miscarriage with toxemia, in good hands.

CASE No. 282.—First pregnancy, severe toxemia without convulsions; second pregnancy severe postpartum convulsions—both babies alive. We are able to advise this patient very definitely against future pregnancies. She was handled with great care both times, especially in her second pregnancy.

CASE No. 299.—No live babies in spite of three pregnancies—patient has a fibroid uterus.

CASE No. 371.—One live baby after two dead ones in other hands.

CASE No. 374.—One live baby after two miscarriages with elevated blood pressure and albuminuria.

CASE No. 388.—No live babies after two, or possibly three pregnancies. This patient has chronic gonorrhea, quiescent.

CASE No. 431.—One live baby after one six month's miscarriage with toxemia. Patient recently pregnant again and miscarried while on vacation.

CASE No. 434.—One live baby after one dead one, for which we can take no credit as she was followed by own physician.

Summing up then in these ten cases we have three in which there has been no result, one has gonorrhea, one has a fibroid uterus, one will not follow directions. In two others we cannot take credit for the babies. In the other five we have obtained three live babies after five dead ones, and two normally delivered babies in the mother's fourth and fifth pregnancy without toxemia, when in her first, second and third pregnancy she had toxemia coming on sooner each time, making necessary difficult operative deliveries in the first and second pregnancy and resulting in a dead baby at six months in the third.

We may credit this idea then with five babies and three mothers in the ten cases, and we believe we have not damaged the other mothers in giving them a chance, as we would had they been true chronic nephritics.

CONCLUSION

I believe that about 14 per cent of women showing toxemia symptoms in one pregnancy, often to the point of fetal loss or forcing delivery, not having chronic nephritis, will tend to show such symptoms in another pregnancy, and that in at least one-half of these, such symptoms and such results can be prevented by excessive prenatal care. The reason for this susceptibility to toxemia in this group we cannot say.

We believe such patients can be taken to the ordinary danger point of toxemia of pregnancy without the almost certain loss of the baby, and without progressive loss of function to the mother, as in chronic nephritics.

Hence we believe in determining as certainly as possible, and as early, in which group each patient belongs.

I wish to acknowledge my indebtedness to B. E. Hamilton of Boston, the internist with whom I have studied some of these cases, and to Judson A. Smith, lately resident Boston Lying-In Hospital, for material assistance in collection of both clinical and laboratory data.

The detailed histories of these seventeen recurrent toxemia of pregnancy cases may be found in the protocol, published in complete form in the Volume of Transactions of the Association for the current year, 1924.

19 BAY STATE ROAD.

(*For discussion see page* 265.)

THE WASSERMANN TEST

IX. The Detection of Syphilis in Prenatal Clinics

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(*From the Evans Memorial, Boston, Mass.*)

THE detection of syphilis in the prenatal clinic depends upon accurate Wassermann tests and careful clinical observations. The unreliability of the Wassermann reaction and the lack of clinical evidence renders the recognition of syphilis in the pregnant woman especially difficult. This paper considers the application of certain problems of laboratory and clinical technic to the routine detection of syphilis in prenatal clinics.

THE WASSERMANN TEST

The ideal Wassermann test for pregnant women should combine sensitiveness and specificity. Although no practical methods of eliminating many technical errors inherent in the present test are available, certain technical safeguards may minimize the factors which interfere with the efficient handling of blood from maternity patients. As long as fundamental principles are observed, minor differences of technic are of little consequence. The essentials are a high titre antisheep amboceptor, titration of pooled complement, inactivation of sera, reliable antigens, suitable standard serum controls, a titration of at least two dilutions of serum, and ice-box fixation.

Serum.—In the blood serum of pregnant women the formation of anticomplementary and nonsyphilitic fixation substances is eight times as frequent as in nonpregnant women. The development of these substances which largely occurs after the withdrawal of the blood is augmented by unfavorable conditions of preservation, as regards time, sterility, and temperature. Blood should be taken not more than forty-eight hours before the test, in clean sterile tubes, preferably coated with paraffin. Especially with pregnant women, the use of uninactivated serum tends to produce nonsyphilitic positives. After a few hours the serum is removed from the clot under sterile precautions and is inactivated immediately at 56° for ten minutes. It is placed in the ice box until the test when it is reinactivated for ten minutes. The double inactivation tends to prevent the formation of anticomplementary and nonsyphilitic fixation substances.

Antigens.—Since there are no truly specific antigens for syphilis, care must be taken to use sensitive antigens which give a minimum of false positives. Plain alcoholic and acetone insoluble antigens, although they

agree closely with clinical findings of syphilis, particularly with water-bath fixation, frequently fail to detect latent syphilities. As high as twenty-five per cent of the positives in pregnant women with cholesterolized antigens may prove nonsyphilitic, but if these more delicate antigens are not employed, an appreciable number of syphilities will be overlooked. Preferably two antigens should be used, a cholesterolized and either a plain alcoholic or acetone insoluble. A composite antigen, such as Kolmer's, may possibly suffice for this double rôle, although I believe that it should replace only the cholesterolized antigen.

The antigenic dose, as tested against an appreciable number of untreated secondary and tertiary cases, should be at least $\frac{1}{100}$ of the anticomplementary, and the amount used for the test should be at least $\frac{1}{10}$ of the anticomplementary dose and ten times the antigenic dose. If the test dose approaches $\frac{1}{2}$ the anticomplementary dose, nonsyphilitic fixation may result, since the serum of pregnant women has a tendency to become anticomplementary.

Technic.—For uniformity in various laboratories the Wassermann test should be performed in simple fractions of the original Wassermann volume and comparative results expressed in terms of the full volume. It is advisable to use the generally accepted antisheep system. The following procedure is one of several which are well adapted for testing the sera of pregnant women. Guinea-pig complement is titrated against a strong amboceptor of several units, in order to offset to some extent the natural antisheep hemolysin present in human blood. A preliminary water-bath fixation is performed with two cholesterolized alcoholic or Kolmer antigens, using the maximum amount of inactivated serum. All positive cases are subjected to ice-box fixation overnight (17 hours) with a plain alcoholic and a Kolmer antigen, a titration of 0.2, 0.1, 0.05, 0.025, and 0.0125 c.c. of serum in terms of the original Wassermann volume being used. Each tube of the titrated serum may be reported numerically, four-plus representing complete inhibition, i. e., 44420.

Results are considered dependable only when the control is *absolutely* clear. In this class of patients, even a slight inhibition in the control may render readings unreliable. The strength of the titrated serum may prove of differential diagnosis since a syphilitic fixation ordinarily is stronger than a nonsyphilitic. However, no arbitrary rule can be formulated as to the correct interpretation of the results with a cholesterolized antigen in differentiating true syphilis, and reports to the obstetrician should be made in terms of the cholesterolized and plain alcoholic or acetone insoluble antigens.

CLINICAL SYPHILIS

The prevailing type of syphilis in the pregnant woman at the prenatal clinic is hidden or latent. Few women voluntarily give a definite history of infection, few have any knowledge of primary or even secondary

lesions, and only a small number show any objective symptoms of the disease. In 5,000 maternity patients who were examined routinely without especial attention to syphilis, definitely clinical evidence was obtained only in 0.54 per cent and suspicious signs in 1.7 per cent, a total of 2.2 per cent, whereas the Wassermann test in the same group was positive in 9.2 per cent. For this reason, the examining physician must rely upon close observation and careful history taking, and must be able to weigh intelligently all suspicious or suggestive symptoms. If every patient is studied as a syphilitic suspect, it is surprising how many more syphilities can be detected in the prenatal clinics.

Clinical History.—In history taking certain facts must be borne in mind regarding the prevalence of syphilis. Sypihilis is twice as common in negroes as in whites. It is more prevalent in foreign nationalities, particularly from the south of Europe, Asia, and Africa. It is governed by social and economic conditions and is closely associated with intelligence. Residence, wealth, and occupation are appreciable factors regulating its distribution.

Syphilis is more prevalent in multiparae owing to longer opportunity for exposure from the husband. Multiparae furnish more information than primiparae, owing to the additional evidence of previous children and fetal deaths. Fetal deaths are only of confirmatory evidence, since but 7 per cent are the direct result of syphilis. However, multiple fetal deaths, which are more often due to syphilis, are of considerable value in connection with other suspicious signs.

The most fertile source of clinical information is the history of the mother, by which about one-half of the cases are detected. Women, either through ignorance or design are prone to overlook or to forget past symptoms which can only be brought out by careful questioning. Secondary symptoms are most readily remembered, whereas the primary lesion escapes notice. Previous treatment affords excellent evidence. Occasionally a history of syphilis in the husband is obtainable either through symptoms, treatment, or Wassermann test. The examining physician should follow a definite line of procedure in obtaining a history keeping in mind the general prevalence of the disease, its effect upon the family and the salient points of evidence in a syphilitic history.

Physical Examination.—Unless syphilis has been contracted during or just previous to pregnancy, the early lesions will not be found. Primiparae are more apt to show signs of early syphilis than multiparae. Evidence of old syphilis must be sought by the examiner, the most fruitful fields being nerve, eye, skin, bone, and cardiovascular irregularities. Unaccounted for paralyses, altered reflexes, pupillary irregularities, changes in fundi, deafness, stigmata of congenital syphilis, lesions of skin and mucous membrane, alopecia, scars, periostitis, and aortic disease are prominent among the pathologic signs of the disease.

THE ROUTINE DETECTION OF SYPHILIS

The detection of every syphilitic entering a prenatal clinic is manifestly impossible. However, any appreciable reduction in the number of cases which ordinarily escape recognition is well worth while. The following tentative and somewhat ideal program will permit greater efficiency in the detection of syphilities in the prenatal clinic. Its success will depend upon the co-operation of the social worker, the laboratory, and the clinical staff of the maternity hospital. Careful clinical examination and routine Wassermann tests should be made at the prenatal clinic. The cases are immediately passed as negative, selected for treatment, or referred for further investigation to the social worker and laboratory according to Procedure I.

PROCEDURE I

WASSERMANN TEST	CLINICAL FINDINGS		
	POSITIVE	SUSPICIOUS	NEGATIVE
Positive	Treatment	Treatment	Refer
Suspicious	Treatment	Refer	Refer
Negative	Treatment	Refer	Pass

A positive interpretation is given to the laboratory report when both antigens are positive and a suspicious, when the plain alcoholic or acetone insoluble is negative and the cholesterolized is positive. The four border line groups in Procedure I are referred to the social worker for investigation of the family, and the Wassermann test is repeated. If the second Wassermann test corroborates the first, it is considered final unless a spinal fluid examination is indicated. If different, further tests are required until uniform results are obtained. With the social worker's report and a second Wassermann test, a further elimination is made according to Procedure II.

PROCEDURE II

WASSERMANN TEST	CLINICAL REPORT OF SOCIAL WORKER AND PHYSICIAN		
	POSITIVE	SUSPICIOUS	NEGATIVE
Positive	Treatment	Treatment	Suspicious
Suspicious	Treatment	Suspicious	Suspicious
Negative	Treatment	Pass	Pass

The final disposal of the suspicious case depends upon the sum total of evidence in the individual patient. Obviously the judgment and opinions of obstetricians will vary. The following scheme is suggested by the writer:—

If the titrated sera of the suspicious cases in Procedure II are strongly positive with the cholesterolized antigen, the patient is treated. If a weak positive, no treatment is given. With each of the untreated suspicious patients the same procedure is followed as with those who

receive antenatal treatment. The placenta is examined for pathologic evidence of syphilis, the infant is carefully watched and subjected to an x-ray examination, and blood for a Wassermann test is taken at the age of two weeks and at subsequent intervals. The reason for not giving presumptive treatment to the prospective mother, particularly when the Wassermann is positive, is due to the occasional unreliability of the reaction in pregnant women and the probability that the child of an old latent syphilitic with a weak reaction would prove healthy without treatment. If sufficient evidence is obtained from the microscopical study of the placenta and x-ray examination, treatment of the child can then be instituted.

SUMMARY

A tentative plan for facilitating the detection of syphilis in prenatal clinics is outlined. Its success depends upon the proper co-ordination of laboratory and clinical examinations, and recognition of the limitations of each as applied to maternity patients.

80 East Concord Street.

TWO CASES OF MYELOID LEUCEMIA COMPLICATED WITH PREGNANCY: TREATED WITH TOPICAL APPLICATIONS OF RADIUM

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PREGNANCY complicated by leucemia is unusual but leucemia complicated by pregnancy is a distinctly uncommon condition. In 1888, Cameron[1] reported five cases of pregnancy developing leucemia, including one of his own, but found no case of leucemia becoming pregnant. Sänger,[2] in 1888, reported two cases from the literature and one of his own, which developed leucemia between the second and third months of pregnancy, going on to delivery of a healthy child. He stated that the blood from the umbilical cord was normal. Sänger agreed with Cameron that some of these so-called "leucocythemias" present in older literature were probably septicemias. Askanazy[3] confirmed Sänger's statement that the blood corpuscles of leucemic mothers did not penetrate through the placenta to the child, and that the child could remain healthy. Peterson,[4] reporting a case in 1914, quotes Baum as never having seen a case of leucemia and pregnancy in twenty years' experience, consisting of 22,000 deliveries. Wallgren,[5] in 1920, felt that there were only three sure cases of acute leucemia in pregnancy in addition to his own. Kosmak,[6] in 1920, found no case before 1888 and

twenty since then. He briefly reports twelve cases, with two of his own. Hansam,[7] in 1922, finds ten cases in the literature and adds another case. Brief protocols of the cases we have been able to find in the literature together with the two cases we are reporting bring the total up to seventeen.

CASE 1.—(Cameron 1888). Aged thirty-six, para vii. Two previous children had leucemia. Tumor developed in left hypochondrium during sixth pregnancy; under treatment for one year for leucemia. Delivered of living male child at end of seventh month. Child died four days later. Autopsy negative for leucemia. Again became pregnant with exacerbation of symptoms. There was early relief of symptoms following delivery, which was accompanied by scant hemorrhage. Child died after fifth month. Again became pregnant resulting in dead fetus. (Lymphatic type.)

CASE 2.—(Sänger, 1888). Leucemia discovered in second to third month of pregnancy. Child born healthy. Blood from cord normal.

CASE 3.—(Greene[8], 1888). Aged twenty-one, para 0. (One sister had died of leucemia.) Conceived June 13; November 25, losing strength. Anemic. Proportion of whites to red 1-20. Forceps delivery December 8, after spontaneous labor. Scant amount of blood lost. Died ten hours after delivery.

CASE 4.—(Laubenburg, quoted by Kosmak, 1891). Aged thirty-two, para ix, three miscarriages, six children, living and well. Gradual decline during past six or seven years. Worse during pregnancy. Improved after labor. First noticed a swelling in left side at fifth month. (Macerated fetus.) Death forty hours after delivery. Autopsy confirmed diagnosis of splenomyelogenous leucemia.

CASE 5.—(Hilbert, Askanazy, 1893). Aged thirty-seven, para viii—developed fever in eighth month. Five weeks later leucemic blood picture. Macerated fetus. Very slight bleeding with delivery. Sudden collapse and death ten hours postpartum. Autopsy confirmed diagnosis.

CASE 6.—(Schroeder, reported by Kosmak, 1888). Aged twenty-five, para v. Always sickly. Two miscarriages. Splenic enlargement after fifth labor. Labor induced resulting in recently dead fetus. Autopsy on child negative. No marked change for better after delivery. (Splenic leucemia.)

CASE 7.—(Melinkow and Zomakion, quoted by Kosmak, 1913). 220,000 leucocytes. X-ray treatment over long period of time. Placental section showed complete separation of the maternal (leucemic) and fetal (normal) blood.

CASE 8.—(Peterson, 1914). Aged twenty-four, primipara. Anemic for seven years. Blood count showed no leucemia although liver and spleen were enlarged. Healthy, vigorous child born prematurely, showing no abnormality. No hemorrhage at delivery. Sudden collapse of mother one and one-half hours after delivery. Autopsy showed in liver, spleen and bone marrow, myeloid leucemic condition.

CASE 9.—(Kosmak, 1920). Para iii; 472,000 leucocytes; 88 per cent small lymphocytes. No autopsy was obtained.

CASE 10.—(Kosmak, 1920). Aged thirty-five, para iv; 106,000 leucocytes; 85 per cent large lymphocytes. Mother died two weeks after delivery.

CASE 11.—(Lindbrones, quoted by Wallgren, 1920). Aged twenty-five, para iii; positive oxidase reaction. Death. Fetus 3.5 cm. long.

CASE 12.—(Meurer[9], 1921). Spontaneous delivery of twins in healthy condition. (Myeloid leucemia.)

CASE 13.—(Hansam, 1923). Aged thirty-eight. One healthy child. 1917, 620,000 leucocytes. Six x-ray treatments. Three and half months later spleen small; leucocytes 71,300. In 1920 became pregnant second time. Small hemorrhage at delivery. Child two weeks premature; somewhat underdeveloped although blood was normal.

CASE 14.—Renon and DeGrais,[10] 1920, report a case of myeloid leucemia which, after eight applications of radium became pregnant, resulting in the delivery of a normal child, which was five and one-half years old when the case was reported.

CASE 15.—Renon and DeGrais, 1920, report another case of leucemia under radium therapy, becoming pregnant, which, however, was interrupted at five and one-half months.

AUTHORS' CASES

CASE 1.—Mrs. L. B., aged 24; family history negative; had malarial fever in summer of 1920. Menstrual history negative—last period July 15, 1922. In September had a slight show for one day. Chief complaints: pressure pains in left hypochondriac regions, swollen abdomen and weakness. In May, 1920, developed pain in upper left abdomen, not severe enough to confine her to bed; at times, however, interfering with sleep. This was associated with swelling of the ankles. In June, 1920, she was admitted to the Royal Infirmary, Manchester, England, for five weeks. Following this, she had ten x-ray treatments of fifteen minutes duration over the splenic area. No improvement followed and she again returned to the hospital and remained there for seven weeks, having fourteen additional treatments of the same duration. She then had x-ray treatments at weekly intervals for entire year, fifty-two in all. The swelling increased rapidly in size after the x-ray treatments were discontinued. The enlargement has always been tender. There has been no history of epistaxis or other bleeding from the mucous membrane. Since July, 1922, she has perspired excessively and the pain has increased; during the three months prior to admission to the Samaritan Hospital, asthenia was profound and she complained of nausea and precordial distress. Admitted to hospital, October 29, 1922.

Physical Examination: Height about five feet four inches, weight 120 pounds; fairly well nourished. Skin warm and moist—color good. Slight dyspnea. Pupils equal and react to light and accommodation—convergence normal; sclera show slight yellowish tinge. Tongue moist, slightly coated, tremulous. Teeth poor, gingivitis and receding gums. Pharynx injected. Tonsils small. Glands: no adenopathy. Neck: some enlargement of vessels with marked pulsation.

Lungs showed increased fremitus over right apex; decreased over right base; no râles. Left border of heart one-half inch inside the left anterior axillary line. Right border one-half inch to the right of the right sternal line. Heart sounds good. Systolic murmur at pulmonic area. Both sounds heard in vessels of neck and murmur heard at suprasternal notch. No thrill. Pulmonic accentuated. Vessels soft. Pulse of equal volume on both sides, of water-hammer type.

Abdomen, extremely distended and tense. Circumference at umbilicus 84.4 cm. and at costal margin 79.6 cm. Spleen filled entire left side of abdomen, to left iliac crest and extended diagonally from a point just to the right of the ensiform cartilage to within about 7 cm. of the anterior superior spine of the right ilium and thence downward to the symphysis. (See Figs. 1 and 2.) Liver extends from fourth interspace 2,5 cm. below the costal margin. Extremities: Reflexes diminished, otherwise negative.

Blood count on admission, hemoglobin 50 per cent (Sahli). Red cells 3,168,000. White blood cells 398,000. Polys 40 per cent; small lymphocytes 1.5 per cent; mononuclears 0.5 per cent; eosinophiles 5 per cent; basophiles 1 per cent; myelocytes

Fig. 1.—Case 1: October 30, 1922, before application of radium.

Fig. 2.—Case 1: October 30, 1922, before application of radium.

neutrophilic 40 per cent; eosinophilic 3 per cent; basophilic 5 per cent. Nucleated reds were present both normoblasts and intermediates. A slight degree of basophilia and anisocytosis were present. (Coagulation time on three different occasions was eight minutes by Boggs-Brodie method.)

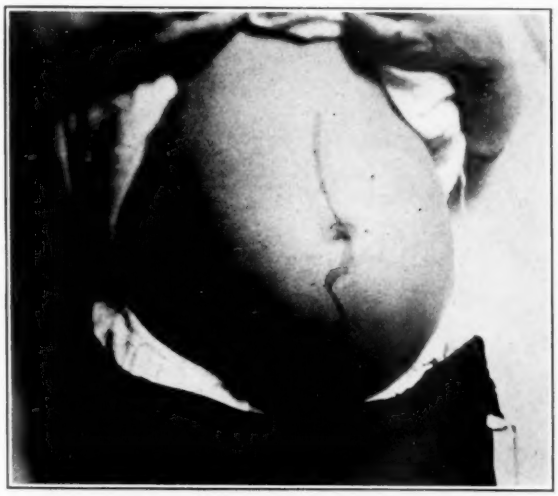

Fig. 3.—Case 1: November 29, 1922, after one application of radium.

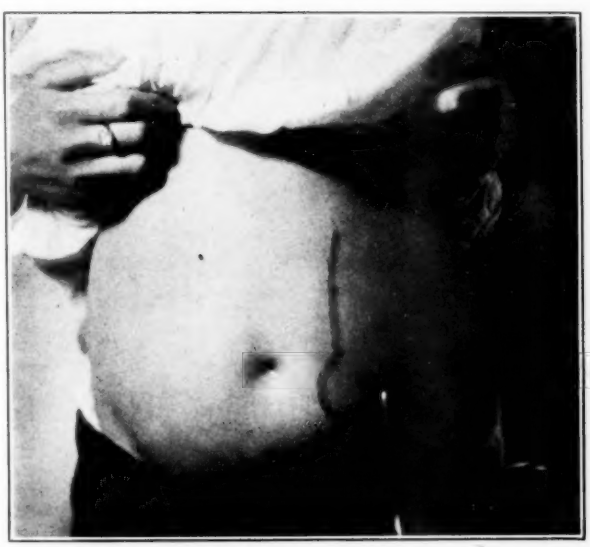

Fig. 4.—Case 1: January 9, 1923, after two applications of radium.

Urinalysis on admission: acid, 1024; faint trace of albumin—no sugar. Microscopic—few epithelial cells, pus cells and mucous shreds; occasional red cells. Phenolsulphonephthalein kidney functional test, 50 per cent first hour, 25 per cent second hour and 20 per cent third hour.

Our technic of radium application was as follows: the border of the spleen was outlined in ink and subdivided in 5 cm. squares. One hundred mg. of radium

enclosed in a brass capsule 1 mm. in thickness was placed 2 cm. distant from the skin and allowed to remain over each blocked area two to four hours, until a total of about 4800 mghr. had been given. The first application of 4800 mghr. was begun October 31, 1922 (Fig. 3). The second treatment of 5400 mghr. began November 29 (Fig. 4). The third and fourth treatments of 4800 mghr. were given January 9, 1923, and February 27. The effect of these applications can be seen

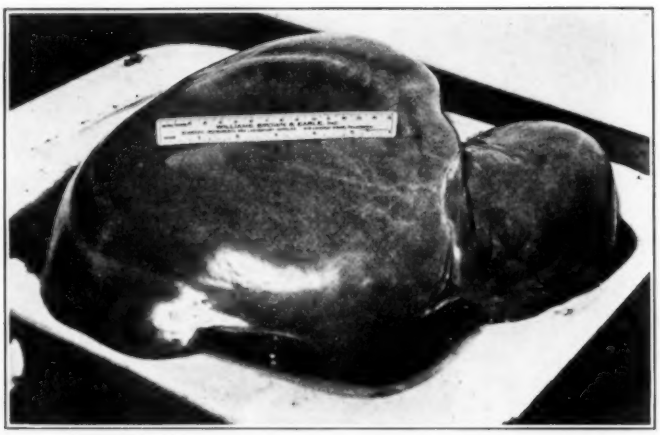

Fig. 5.—Case 1: Liver—weight, 7.17 kilos.

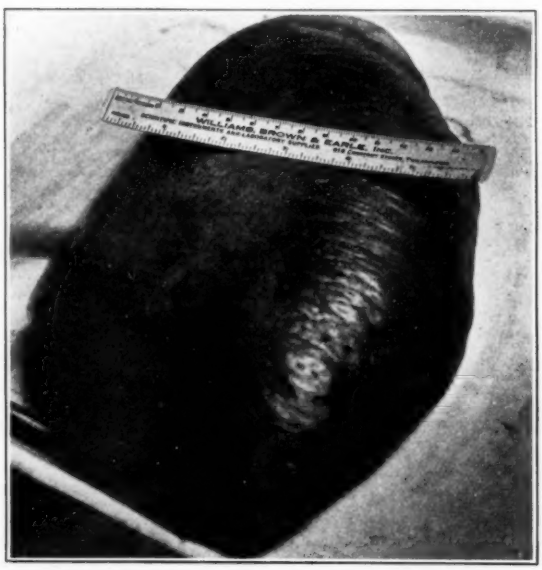

Fig. 6.—Case 1: Spleen—note uniform enlargement and maintenance of shape after removal. Weight, 2.25 kilos.

in Table I. The last application, 2400 mghr. on June 28, showed no effect on the blood picture.

The patient entered the hospital for delivery June 26, 1923, complaining of pressure pains at lower border of the left ribs, posteriorly. On June 28, 100 mg. of radium were applied over five areas for a total of 2400 mghr. This was followed by a slight increase in temperature with an increase in the size and tenderness of

the liver. The spleen diminished somewhat in size but the leucocytes increased in number slightly. The patient went into actual labor July 19 at 7 P. M. and was delivered of a living male child at 9:30 P. M. July 21. During the third stage there was no hemorrhage or laceration. At 5 A. M., July 22, patient vomited a large quantity of liquid and died 6:30 A. M., nine hours after the delivery.

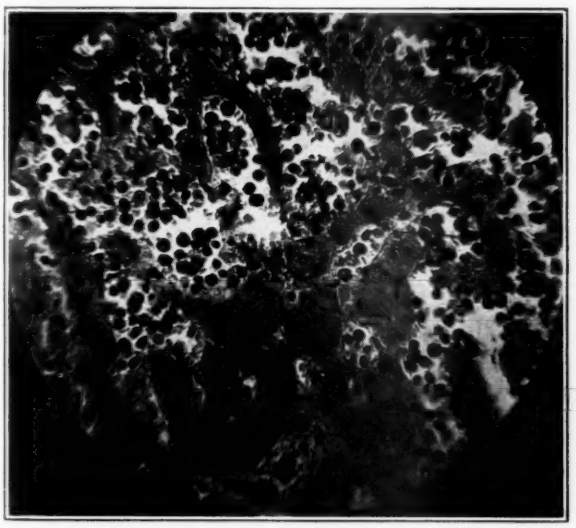

Fig. 7.—Case 1: Liver (high power). Note atrophy of liver cells and presence of myelocytes and myeloblasts in sinusoids.

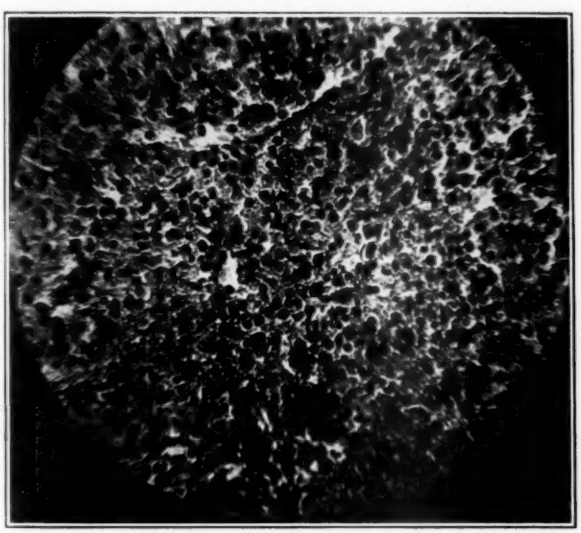

Fig. 8.—Case 1: Spleen (high power). Note absence of marked fibrosis and indistinct outline of sinuses, due to myelocytic infiltration.

The salient points in autopsy were as follows:

Heart: about 200 c.c. of clear pale greenish fluid in pericardial cavity. Normal size—pale and somewhat flabby. Lungs edematous. Liver: lower border on a level with the umbilicus in the mid-line and reached to the crest of the ilium on the

right. Uniformly enlarged. Quite soft in consistency and pale in color. Lobulations indistinct (Fig. 5).

Spleen: Extended almost to crest of ilium on the left. No adhesions. Notch well marked. Greatly enlarged, 35 x 22 x 10 cm., weigh 2.25 kg. Firm in consistency. Capsule gray and showed a few small whitish patches slightly raised above surface. It cut with great resistance and showed firm red splenic pulp and thickened trabeculae. Malpighian corpuscles not visible. Small accessory spleen at hilum. (Fig. 6.) Kidneys: slightly larger than normal, soft in consistency and pale in color. Cortex normal in width. Striations regular. Malpighian bodies visible in places. Ovaries: small, 1 x 2 x 0.5 cm., and firm in consistency. Surface roughened. No adhesions. Uterus enlarged, soft and boggy. No glandular enlargement.

Microscopic Examination: Liver—capsule thin. Lobulations indistinct, due to fatty degeneration of many liver cells, atrophy of some and destruction of a few and filling of the sinusoids with rather large, deeply staining mononuclear, granular and nongranular cells (myelocytes and myeloblasts) (Fig. 7). Spleen: Capsule

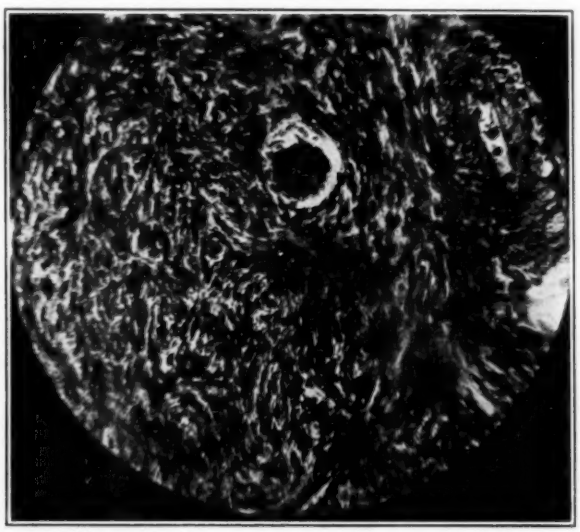

Fig. 9.—Case 1: Ovary (high power). Note slight increase of fibrosis, absence of cellular infiltration and normal immature graafian follicle (shrinkage due to fixation).

and trabeculae thickened. Splenic reticulum slightly fibrosed and sinusoids filled with myelocytes and myeloblasts. Malpighian corpuscles decidedly atrophic and hard to identify because of myelocytic infiltration. (Fig. 8.) Kidneys: capsule thin. Bowman's capsule and glomerular tuft appeared normal. No area of abnormal cell infiltration. Epithelium of tubules swollen, granular and desquamating in places. Ovary: Peritoneal coat somewhat thickened. Stroma seems to show slight increase in fibrous tissue. Blood vessels were somewhat thickened. Numerous corpora albicantia were present and many primordial and immature graafian follicles, in all respects normal (Fig. 9). One graafian follicle was present in the section examined, about one-half developed, showing a small round-cell infiltration at one edge. No other areas of cellular infiltration were observed.

Case 2.—C. F., aged 25. Family and personal history negative. Patient first menstruated when twelve years of age. This occurred but once, and was of three days' duration, moderate in amount and painless. Between the ages of twelve and seventeen at the time of the monthly period she suffered from epistaxis. This

usually lasted from five to ten minutes. When she reached the age of seventeen she menstruated every twenty-eight days, four to five days' duration, of moderate amount and painless. Her period on August 7, 1923 was normal. She was married September 5, 1923. September 7, she began to menstruate; the flow was very profuse and was accompanied by lower abdominal pain, colicky in nature, which confined her to bed. There was no nausea or vomiting. Flow ceased September 12 and she felt well enough to be about. September 14, however, flow returned, rather scant in amount, painless, and lasted until September 23. Since then there has been no bleeding or leucorrhea. Felt movement about February first. From February second to twenty-third, she complained of backache; no nausea or vomiting. Breasts increased in size. About November 15, 1923, she developed pain in the epigastrium and left hypochondriac regions, not severe enough to interfere with sleep. It was worse during the day, not influenced by the taking of food nor associated with

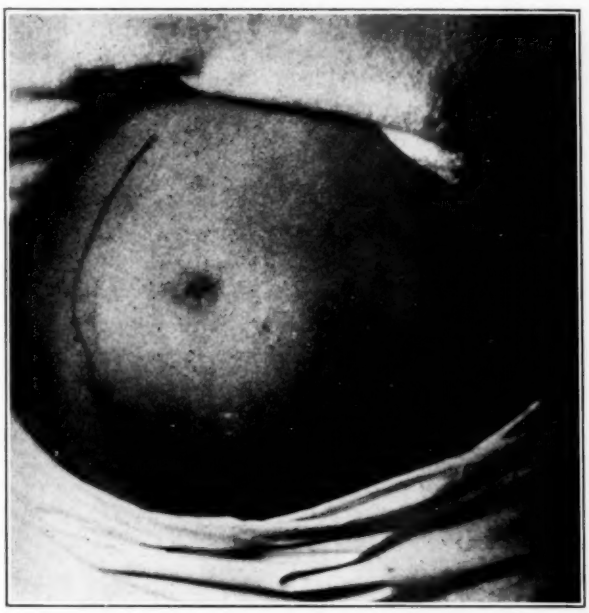

Fig. 10.—Case 2: On December 24, 1923.

nausea or vomiting. About this time she became rather weak. She was not constipated and did not complain of vertigo, cephalalgia, fever or sweats. She did not notice that her abdomen was larger than normal until her attention was directed to it by her family physician.

Physical examination, December 24, 1923. Height five feet four inches, weight 118 pounds. Pupils react to light and accommodation. Slight degree of exophthalmos, (bilateral). Teeth in good condition. Thyroid normal size. No adenopathy. Lungs negative. Heart sounds normal. Abdomen appeared to be enlarged to about the size of a seven months' pregnancy. Mass filled about two-thirds of the entire abdomen, extending from midepigastrium obliquely downward to within 5 cm. of the anterior superior spine of the right ilium; the lower border extending from here to a point 7 cm. above the anterior superior spine of the left ilium (Fig. 10). Liver enlarged about 3 cm. below right costal margin. Uterus about the size of a two and one-half months' pregnancy. No other abnormality noted. No free fluid in the abdomen.

Extremities normal. No varicosities. Reflexes, superficial and deep, present—no Babinski. Urinalysis negative.

Blood count on admission December 29, 1923, Hb. 60 per cent (Sahli); R.B.C. 3,460,000; W.B.C. 248,000; polys 54.7 per cent; eosin. 2.8 per cent; baso. 0.7 per cent; small lymphs. 0.7 per cent; large lymphs. 0.3 per cent; neut. myelo. 33.3 per cent; eosin. myelo. 3.6 per cent; baso. myelo. 3.8 per cent. Wassermann negative.

Patient entered hospital December 29, 1923. Splenic area was blocked into squares, 5 x 5 cm. Over this was placed 100 mg. of radium, screened by 1 mm. of brass 2 cm. distant from skin. This was changed every four hours. A total of 5400 mghr. was given. Patient was discharged from hospital, December 31. The change in the blood picture may be seen in Table II.

Patient reported to the hospital weekly for blood counts. On April 26, count

Fig. 11.—Case 2: March 28, 1924, thirteen weeks after one application of radium. Pregnant uterus outlined below.

showed an increase to 74,000 leucocytes per cm. At this time arrangements were made for admission to the hospital for further radium treatment, on May 3, 1924. She was readmitted May 1, 1924, complaining of severe headache and with symptoms of broncho-pneumonia, respiratory embarrassment and cardiac failure, blood count showed R.B.C. 4,432,000; W.B.C. 242,400; polys 33 per cent; eosin. 5 per cent; baso. 1 per cent; small lymphs. 3 per cent; large lmyphs. 3 per cent; mononuclears 1 per cent; neutrophilic myelocytes 30 per cent; eosin. myelo. 3 per cent; baso. myelo. 3 per cent; myeloblasts 18 per cent. Radium treatment was deferred until the patient should show improvement in her pulmonary condition. She died May 3, 1923. It is possible that much of the respiratory embarrassment was due to an overcrowding of the capillaries in the alveolar walls with white cells and that radium treatment might have ameliorated this condition. Permission could not be obtained for an autopsy which might have confirmed this supposition.

TABLE 1

WEEK OF OBSERVATION	2	3	6	7	11	12	14	18	19	20	35	36	37
Date	11/5/22	11/13/22	12/2/22	12/11/22	1/8/23	1/15/23	1/29/23	2/26/23	3/5/23	3/12/23	6/29/23	7/5/23	7/14/23
Hb.	48%	49%	61%		75%	75%					56%	45%	45%
R.B.C.		3,040,000	3,752,000	3,276,000	4,200,000	4,320,000	4,592,000	4,000,000	4,080,000	4,000,000	3,900,000	2,330,000	2,760,000
W.B.C.	218,400	104,000	127,200	36,200	50,000	18,600	14,200	22,400	21,000	27,000	45,000	85,400	90,800
P.M.N. %	47.5	62.4	63.7	60.5	66.9	81.8	77.0	65.0	73.8	70.3	67.2	76	66.1
P.M.E. %	2.5	0	0.7	0.9	0.8	0	0	0	0	0	0	0	0
P.M.B. %	2.0	4.0	1.4	2.5	0.8	0	2.8	2.5	2.9	0.8	0	2.5	3.0
Small Lymphs. %	3.2	5.6	0	10.9	2.3	4.5	9.2	0.8	8.9	0.8	10.9	1.6	4.7
Large Lymphs %	1.1	4.0	2.0	5.9	5.6	0.9	0.9	6.5	1.8	1.3	3.3	1.7	3.0
Mono-nuclears %	1.1	1.6	0.7	3.4	0.8	1.9	1.9	5.9	1.8	0.8	1.7	0	0
Transi-tional %	0.3	2.4	0	0	1.6	1.9	0	0.8	0.9	0	0.9	0.8	0
Neut. Myelo-cytes %	30.0	15.2	31.5	14.3	20.4	8.1	8.2	18.7	9.0	23	14.3	9.1	18.5
Eosin. %	0.3	0	0	0	0	0	0	0	0	0	1.7	0.8	0
Basoph. %	7.	4.	0	1.6	0.8	0.9	0	0	0.9	3.0	0	7.5	4.7
Myeloblasts %	5.0	0.8	0	0	0	0	0	0	0	0	0	0	0

TABLE II

WEEK OF OBERVATION		1	2	4	6	9	10	13	14	15	15
Date	12/29/23	12/31/23 2 P. M.	1/4/24	1/19/24	2/1/24	2/28/24	3/5/24	3/28/24	4/5/24	4/12/24	4/17/24
Hb.	60%			56%		70%	70%				
R.B.C.	3,456,000	4,050,000	3,760,000	4,070,000		4,128,000	3,810,000				
W.B.C.	248,000	206,600	165,600	38,400	18,400	10,280	9,600	9,550	13,500	15,000	15,550
P.M.N. %	54.7	58.5	64.4	68.3	76.5	87.5	74.5	81.5	77.5	86.5	70.0
P.M.E. %	2.8	1.3	1.4	0.7	0.9	0	1	3.5	3.7	0.5	1.7
P.M.B. %	0.7	0.6	0	0	0	0	1	1	0	0.5	0
Small lymph %	0.7	1.3	3.5	4.9	9.6	7.4	16.5	7.0	7.5	9.5	8.6
Large Lymph %	0.3	0.6	0.6	1.5	0	3.7	2	2.5	2.8	1.5	0.8
Mononuclears	0	0	0	0.3	0	0	2	1.2	1	0	2.7
Transitionals	0	0	0	0	0	0	1	0.5	1	0	1.7
Neut. Myleocyte	33.3	36.6	28.7	22.8	13	7.4	2	2.5	6.3	2	14.5
Eosin. %	3.7	0.5	0	0	0	0	0	0	0	0	0
Basoph.	3.8	0.6	1.4	1.5	0	0	0	0	0	0	0

DISCUSSION

In discussing one of the rarest forms of the primary anemias, according to Cabot[11] five times as rare as pernicious anemia, one seems justified in referring briefly to the present day conceptions of the etiology, touching briefly the pathology and symptomatology and contrasting the various treatments advised.

Etiology.—Practically nothing definite is known as to the cause; according to E. H. Funk,[12] Sternberg considers that acute myeloid leucemia is not a definite disease and that the symptoms are due to a septic infection, especially by streptococci and that acute lymphatic leucemia is due to a general infection. Funk also quotes Berlinger[13] who reports six cases, four of which were regarded as acute. No bacteria were found in the blood or in the organs in any case, nor did the postmortem changes correspond with those of sepsis in any of the cases. Arvid Wallgren[5] reports four cases of pregnancy complicated by acute leucemia and notes the marked contrast in the results of the examination of the blood of the mother and that obtained from the placenta; in the former a typical leucemia picture, in the latter, normal blood. One child remained in good health and histologic examination of sections from the spleen, liver and bone marrow of the other three failed to reveal any evidence of leucemia, which he felt argued against any infectious origin.

According to MacFarland[14] there seems to be hereditary predisposition to the affection. He mentions the case of a woman reported by Emerson, whose grandmother, mother and one brother were leucemic, and who had borne two children who died of the disease; she also had three healthy children.

Young[15] presents the results of a further study into the etiology of leucemia and an account of lymphoma and lymphosarcoma experimentally produced in the mouse. He studied three cases of leucemia and obtained from the blood of each, an organism similar to that previously isolated from human carcinoma. Subsequent to the death of one of the patients a growth in pure culture was obtained from the liver. This culture, when injected into mice, produced lesions similar to those found in mice infected with the mouse strain. The organism was isolated, not only in lymphatic leucemia but also in the myelogenous variety; a fact that argues in favor of the common etiology of these diseases.

Ewing[16] states "that while it is impossible to prove that leucemia is always caused by a single infectious agent or that it represents anything more than a clinical entity comparable to leucocytosis, these various lesions belonging to essentially the same condition illustrate every gradation from an acute inflammatory process up to a chronic and somewhat malignant neoplasm."

Inasmuch as the cause of the disease is not known, it should be classed with the malignant neoplasm, at least for the present. Anders[17] states that "it is likely that the direct cause of the leucocythemia is a simple increase of the cytogenic function of one or more of the hematopoietic organs."

Mallory[18] says that "the myeloblastoma is a fairly common and very important tumor which has been generally recognized as such only within recent years. The usual form under which it appears is as myelogenous leucemia. * * * If the cells of the tumor are proliferating slowly, many of them have the opportunity to differentiate into fully developed leucocytes. * * * When the tumor is growing rapidly the cell differentiation may be slight."

Symptomatology.—The symptomatology differs in the acute and chronic forms. In the acute forms, hemorrhage, prostration and fever are more marked and the splenic tumor develops quickly. In the chronic form, however, at least 50 per cent consult the physician for a mass in the abdomen—this may or may not be associated with pain. According to Osler,[19] about one-third become aware of their illness by loss of weight and strength. In this type of case, the disease has existed for months before the patient consults a physician. Hemorrhage is not a prominent symptom and was not present in the two cases reported.

Digestive disturbances, constipation, or at times an obstinate diarrhea are frequent complaints. Exophthalmos and priapism are less frequently noticed, although both of our cases presented a moderate degree of bilateral exophthalmos. Fever of a moderate degree is usually present at some time during the course of the disease, and dyspnea, due in the early stages to a leucocytic overcrowding of the pulmonary capillaries and later to a pleural effusion, is not an uncommon symptom.

Treatment, Intravenous Medication.—Little or no benefit has followed intravenous injection of arsenic preparations. Lowenburg[20] reports a case of lymphatic leucemia in a boy nine years of age who showed a marked reduction of cellular elements following the intravenous injection of 0.3 gm. of neosalvarsan. Lowenburg is of the opinion that the hemolytic action of the arsenic was responsible for a drop in hemoglobin from 65 to 19 per cent; erythrocytes from 2,330,000 to 1,410,000 and leucocytes from 29,600 to 2,400.

Quaba and Ohashi[21] report a case of acute lymphatic leucemia in a boy of five years and nine months old in which 0.15 and 0.1 gm. of neosalvarsan were given intramuscularly eleven and eighteen days apart. There was a marked reduction of white cells, from 84,610 to 19,040, but this was accompanied by a reduction of hemoglobin and erythrocytes and the patient died at the end of five months.

Meurer[9] gave 50 mg. of tartar emetic intravenously eight times ap-

parently with good results in a case of myeloid leucemia associated with pregnancy, the mother giving birth spontaneously to twins who lived and showed no evidence of the disease.

Renon and DeGrais[10] used in addition to the topical applications of radium, intravenous injections of radium and mesothorium sulphate in doses of 20 mg. every two days for fifteen days. They also gave 25 drops of benzol daily for short periods of time.

Benzol in the Treatment of Leucemia.—Funk[12] quotes Vaquez Yacoel as reporting a case of myeloid leucemia treated by benzol in which the cure lasted eight years, but states that benzol is being used less and less each year.

Toxic effects following the administration of the drug are frequently reported; gastrointestinal disturbances, headache, dizziness, kidney irritation and hemorrhage. Marked leucopenia with increasing anemia and death may occur. Boardman[22] calls attention to the deaths reported by Meumann and Stein following the administration of the drug. In Meumann's case the white cells dropped to 200 per c.mm.; the patient developed severe nose bleed and died thirty-nine days after discontinuing the drug.

Autopsy showed aplastic bone marrow and central necrosis of the liver. In Stein's case, the white cells decreased in 16 days from 73,000 to 8,000. At this point benzol was discontinued but the destruction of the leucocytes progressed, reaching 460 per c.mm. Epistaxis developed and the patient died twenty-two days after discontinuing the drug. Salol coated capsules containing 0.5 gm. of benzol, with equal parts of olive oil to diminish the irritating effect, are given. Two of such capsules are given at first, increasing until ten (5 gm.) a day are administered. They should be taken immediately after meals, and never during meals, and according to Bordman, it is important that the patient be kept in the hospital during the treatment. It may take ten days to three weeks before the effect upon the blood is observed. It is customary to stop administration when the white count has reached 20,000.

Boardman states that 16 out of 100 cases failed to show improvement and that another eight cases, although reacting favorably at first, died during or soon after the discontinuance of the treatment.

Operative Treatment.—The majority of our textbooks of surgery advise against splenectomy in the treatment of leucemia. Duane and Greenough[23] do not mention splenectomy. They state, however, that topical applications of radium give temporary relief. Warbasse[24] states that "Leucemia is no longer treated by splenectomy as the operation is found not to give relief." DaCosta[25] is of the opinion that splenectomy should not be performed in leucemia. Ashurst[26] says, "Splenectomy is contraindicated in most cases of leucemia; it may be necessary in some early cases." Giffin[27] reports twenty-five patients splenectom-

ized after preliminary treatment with radium. Seven persons lived more than three years after operation. Giffin[28] also states that "they (the Mayos) have done splenectomy in not more than one case in every twenty-five or thirty cases that we have seen"; that "occasionally we have removed spleens of the hard fibrous type in very chronic types of the disease," and that "in the great majority of cases of myelogenous leucemia, splenectomy is of questionable value."

X-Ray Treatment of Leucemia.—In a review of the literature on the x-ray treatment of myelogenous leucemia, one is confronted with variations in technic and management, depending to a great extent upon the individual operator. One of the most important points to be determined is the question of treating the bone marrow. Stengel and Pancoast[29] stated that "applications should be made systematically to the bones of the entire body with the exception of the head," and "that direct exposure of the spleen and other secondary enlargements should be carefully avoided during the earlier part of the treatment." They were convinced that the "bone marrow is the primary seat of the morbid process no matter whether the disease is of the so-called myelogenous type or of the lymphatic variety."

During the past twelve years, however, operators have been treating the bone marrow less frequently until at the present time few advocate the procedure. One of the most recent operators, G. E. Richards[30] advises against this procedure as do Ordway[31] and Boardman. There is also a tendency to use the smaller doses of roentgen ray; thus Richards, in describing the results obtained in the treatment of twenty-two cases, states that "our results would lead us to the conclusion that better results are to be obtained by a technic designed to depress the function of the cells which are in a condition of hyperplasia than by one designed for the destruction of the cells. The use of terrific radiation with high spark gap and heavy filtration will result in extreme fibrosis of the spleen, and other changes of a permanent and disadvantageous nature in the medulla of the bones, and will not give as good ultimate results as a less severe procedure." Radiation is commenced on the spleen, using areas four inches square and limiting the treatment to one area each day. This technic eliminates nausea and brings the patient gradually under the influence of the rays. He emphasizes the importance of maintaining the spleen at its minimum size, that once having been made to disappear, it should remain so, as the chance of its responding to radiation after a secondary enlargement is very slight. The same conditions hold for radium according to Renon and DeGrais.[32] Many observers report better results in the treatment of leucemia with benzol and x-ray than with x-ray alone. Among these are Lafleur[33] and Edwin Schisler and E. E. Brown.[34] The report of the latter includes a complete study of the effect of the roentgen ray and benzol on the normal and abnormal

blood content. Benzol and x-ray had no ill effect on the hemoglobin or red blood cells. X-ray seemed to destroy polymorphonuclear leucocytes or to slow up their production, but had relatively no such effect upon the red cells or their production. The x-rays in every trial produced a decrease in the absolute number of small lymphocytes but had no constant effect on the relative count. Myelocytes were not so affected; relatively they were decreased by the x-ray, while the absolute number showed no constant change. Benzol, on the other hand, caused a steady fall in the absolute but did not affect the relative myelocyte count. Polymorphonuclears were destroyed constantly and rapidly by each dose of the x-rays. The absolute count was affected more markedly than the relative. Benzol gave a slighter absolute decrease of polymorphonuclears than the x-rays and a more constant and rapid increase relatively. Basophilic myelocytes disappeared readily under benzol only to reappear temporarily after each dose of x-rays. As the blood picture approached normal limits, the basophilic myelocytes were reduced under benzol, reappearing when benzol was discontinued and were again present following the administration of x-ray; on resumption of benzol they again disappeared. The x-rays had less effect on reducing the myelocytes than the lymphocytes and leucocytes.

Treatment of Leucemia by the Gamma-Rays of Radium.—The acute types of leucemia, whether of the myelocytic or lymphatic variety are refractory to treatment. Ordway[35] states that radium is of no value in the acute splenomyelogenous leucemias, and a thorough search of the literature fails to reveal cases that have been successfully treated by any method. In the chronic types of leucemia, radium is the treatment of choice. The literature abounds in reports of cases treated successfully by the gamma-rays that have been refractory to other forms of treatment. Simpson[36] quotes Renon, DeGrais and Desbouis, who obtained remission by application of radium in a patient previously unsuccessfully splenectomized, the white count dropping from 143,000 to 21,500. They accounted for the effect by the exposure to the rays of a large volume of blood circulating in the abdomen. Ordway[31] has obtained remissions with radium in cases of leucemia that were completely resistant to the x-rays. Case 1 in our report received x-ray treatment over a period of eighteen months with only temporary improvement, but responded to the first application of the gamma-rays of radium. Peabody,[37] Henriques and Merville,[38] Bowing[39] and others have reported series of cases that have been successfully treated by topical applications of radium. As yet, however, it must be regarded as palliative only and not curative. It may be that the intravenous injections of thorium as advocated by Falta, Kriser and Zehner[40] will produce more favorable results.

Technic of Radium Treatment.—In cases observed by us, the border of the spleen was outlined in ink, and subdivided into 5 cm. squares;

radium in brass capsules 1 mm. in thickness was placed 2 cm. from the skin. Each area received from two to four hundred milligram hours. The number of total milligram hours varied from 2,400 to 5,400. Blood examination was made every two weeks (at times more frequently) and treatment was not repeated if hemoglobin and red cells showed an increase and the white cells a decrease in number and no application was made with a leucocyte count lower than 20,000.

There is a diversity of opinion regarding the duration of application of the radium. Henrique and Merville[38] advise a maximum of 2,200 to 2,400 mghr. spread over four areas, near the center of the spleen and repeated monthly, claiming that the gamma-rays affect the spleen itself aside from the action on the blood as it enters the spleen; also that by "moderate doses applied monthly we do not only diminish the white count but also exercise a certain regulatory action upon the splenic function and through it, upon the hematopoietic system in general." Ordway[31] states that radium applied to the spleen is a marked stimulus to red-cell formation. Whitcher[41] also advises moderate doses 1,400 mghr. repeated twice monthly.

On the other hand, Peabody[37] states that "recent results have seemed to indicate that the administration of one or several large treatments followed by an intermission of at least several weeks, until all evidence of radium action has ceased, is more satisfactory than the use of smaller doses at more frequent intervals." DeGrais[42] advises intensive treatment 4,400 to 4,800 mghr. He reasons that subsequent applications are not as effective as the first owing to the production of fibrosis in the spleen.

Most writers agree that the bone marrow should not be subjected to the action of the gamma-rays, Soiland,[43] Simpson[36] and Witcher,[41] the latter calling special attention to the danger of treating bone marrow at the same time, since its power to produce red cells may be weakened so that the red cells and hemoglobin decrease along with the leucocytes. In this regard one must keep in mind the indirect effect of the gamma-rays on portions of the hematopoietic system other than that radiated; also the marked sensibility of the lymphocyte to radiation (Leo Loeb[44]). Small doses of either x- or gamma-rays produce a temporary decrease in the number of lymphocytes, but if the larger ones are given, the initial drop is followed by still greater destruction. We have observed, not only in leucemias but in other malignant processes, that an increase in the absolute number of lymphocytes has been associated with improvement and vice versa.

According to Murphy and Wakahara[45] the increase in the number of lymphocytes is due to an increased multiplication of cells in the germ centers of spleen and lymph nodes and they believe that the latter are responsible for the increased number in the circulating blood. They feel that this stimulation is not the result of a direct action of

the rays but due to a substance which appears in the blood following radiation, which, when mixed with lymphatic tissue *in vivo* exerts a stimulating effect upon the latter. This we have also observed clinically in a case of pseudoleucemia, axillary nodes disappearing almost miraculously after radiation of the hypertrophied cervical glands. In any instance the treatment of leucemia by radiation is not the simple problem it apparently seems to be. If this is true of uncomplicated myelocytic leucemia, we have still a greater problem when the disease is associated with pregnancy.

In reviewing the literature we have been struck by the tremendously high maternal mortality in cases of myeloid leucemia that have been permitted to go to term or near term. Death occurred almost invariably from one and one-half to forty hours following delivery. No apparent immediate reason was set forth as the cause of death. In our own case which occurred during the tenth hour following delivery, postmortem revealed the usual changes plus pericardial effusion of moderate degree.

Effect of Radiation on the Blood.—Within a week following the application of radium there is a diminution in the total number of leucocytes. This is most marked in the immature type of cells, both myelocytes and myeloblasts, with a relative increase in the polymorphonuclears and lymphocytes. The permanence of this diminution varies directly with the dosage. Coincident with a fall in leucocytes there is usually an increase in red cells and hemoglobin. In Case 1 the leucocyte count just before death reached 90,880 and showed no apparent effect from radiation over the spleen the latter part of June. This last radium treatment was followed by a rather marked reaction; the liver increasing in size and becoming quite tense and tender, possibly due to the addition of a cellular destruction from the spleen, on the already overworked liver. At no time was there absence of myelocytes in the peripheral blood, although the percentage fell quite markedly from the original figure of 40 per cent to less than 10 per cent under radium therapy.

In Case 2, following one application of 5,400 mghr., the leucocytes steadily fell to 9,550 per cm., thirteen weeks later. Beyond an initial nausea, following this large dosage no untoward effects were noticed.

In any patient under radium treatment, whether for malignancy, leucemia or any other disease, we have made frequent blood counts routinely and have attempted by this means to keep the dosage of radium less than that which will produce a marked diminution in the normal absolute number of lymphocytes, approximately 2,000 per cubic mm., having noted that a great destruction of lymphocytes was not associated with improvement and vice versa. In Case 1, the lowest lymphocyte count of just above 1,000 was noted one week after 5,400 mghr. In Case 2, the lowest figure of slightly below 1,000 per cubic

cm. was encountered thirteen weeks after the initial treatment, but the following week had reached 1,500.

In Case 1 it is a little difficult to fix the date at which conception occurred. When examined on June 19, 1923, the size of the uterus corresponded to that of a six months' pregnancy. The age of the child on delivery, July 21, 1923, was estimated at six and one-half months, and was normal in all respects from outward appearance and blood count. To correspond to the size of the child at delivery, conception probably occurred some time during January, which would mean that the patient had already had three radium applications, a total of 15,000 mghr. One might be permitted to assume that this rather large amount would be sufficient to produce a decided effect on the germinal cells of the ovary, for it is an established fact that the immature cells of both ovary (ovum) and testis (spermatozoa) are most susceptible to radium rays and yet both ovaries at postmortem showed distinct and apparently normal primordial follicles (Fig. 9).

Matthews,[46] in experimental work on the ovaries of laboratory animals, found no change after 80 mghr. of radiation. Above 1,200 mghr. there was some round-cell infiltration and some fibrosis of the blood vessels and stroma, with a few imperfect or no graafian or primordial follicles. The same findings were encountered in the human ovaries studied. Young and healthy ovaries stood more radiation than older, less active ones.

The apparent resistance and immunity of the ovary in our case must be due to the fact that it was pushed far down into the pelvic cavity by the increased intraabdominal pressure of the enlarged spleen and was thus protected to some extent from the full effect of the rays. Although early in the treatment, when the spleen extended to the pubis, and was radiated in this area, some of the rays must surely have penetrated quite deeply into the pelvis, although their actual intensity was probably diminished by the intervening spleen and short local application (3 to 4 hrs.).

Quite recently there has been some trepidation in current literature regarding the effect of radiation of the pelvic organs on pregnancy and the development of the child. Bagg,[47] experimenting with white mice, found that radiation of the generative organs resulted in maldevelopment of the offspring. The effect of radiation was not apparent in our case from histologic study of the ovary, nor was the child abnormal in any respect. Renon and DeGrais report normal, perfectly formed children in their cases, one living and well five and one-half years later. Hansam's case, although small, being two weeks premature, was normal. In this connection it might be interesting to note the case Keene[48] reported, with an external carcinoma of the cervix, first seen during the fifth or sixth month of pregnancy. The patient received 4,000 mghr. radium treatment, was delivered in the

eighth month and both mother and child were well eight years later.

Pregnancy occurring in cases of myelogenous leucemia is uncommon enough as a search through the literature has shown, but it is extremely rare in cases under radium treatment.

Of the seventeen cases reported, two others beside our own became pregnant while under radium treatment, Cases 14 and 15 and two others following x-ray treatment, Cases 7 and 13. In Case 14, the original blood count was 240,000 W.B.C., the spleen was 22 cm. in length, extending from xiphoid to pubis and 13 cm. to the right of the midline. Treatment consisted of intravenous injections of radium and mesothorium sulphate and benzol by mouth in combination with topical applications of 189 mg. of radium bromide (101 mg. of pure radium) filtered through 2 mm. of lead and 1 cm. of gauze. This quantity of radium was so arranged that each square cm. of surface was covered by 2.4 mg. of radium and one treatment consisted of 4,848 mghr. After eight such treatments, the patient became pregnant, was delivered and finally died three years and one month after the first treatment, having had sixteen topical applications in all. In the second case of Renon and DeGrais (Case 15), pregnancy was terminated at five and one-half months for the good of the patient, which seems to be the accepted therapeutic procedure. In this case, the child, although dead, was in all respects normal.

The child in our case weighed, ten days after birth, two pounds ten ounces. Physical examination showed a small child with no glandular enlargement or marked enlargement of the liver or spleen. Differential smear from the placental end of the cord at birth showed a normal fetal blood picture of occasional myelocytes and many nucleated red cells (normoblasts). Blood count from baby July 31, 1923, ten days after delivery, was as follows: Hemoglobin 90 per cent (Sahli); red blood cells 4,800,000; white blood cells 12,000; polymorphonuclears 65 per cent; small lymphocytes 32 per cent; large lymphocytes 3 per cent; transitional 2 per cent. The child did not thrive on artificial feeding, gradually lost weight and died August 11, 1923. Autopsy was denied.

CONCLUSIONS

From a review of the literature and our own personal observations in these two cases of leucemia and pregnancy and other leucemias, we feel that heavy initial doses of radium are to be preferred to repeated smaller doses; and that of equal, if not greater importance, is the early emptying of the uterus in cases complicated by pregnancy.

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2008 WALNUT STREET.

REPORT OF 224 CASES OF IMPETIGO IN THE NEWBORN*

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THE purpose of this paper is to call attention to the condition known as contagious impetigo of the newborn and to show the various ways in which it is manifested. There is confusion in the literature because the terminology of the different types has been interchangeable and loosely applied. The most serious form of the disease is that in which the vesicles coalesce rapidly and then rupture, leaving large areas of exfoliation. This condition is known as exfoliative dermatitis. Pemphigus is the term applied to those cases in which there are large blebs and this form is rarely seen although the name is that popularly applied to all forms. A third type and the one most often found is that in which there is a formation of small vesicles that may coalesce but do not result in large areas of exfoliation and this condition is known as impetigo. In the epidemic about to be described we have had experience only with the so-called vesicular and exfoliative forms.

*Presented, by invitation, at a meeting of the New York Obstetrical Society, November 11, 1924.

†One hundred and seventy-nine cases occurred on the second division. The remaining cases occurred on the third division when the epidemic was ending and are included in the report through the courtesy of Dr. Rice.

History.—As early as 1864 Tilbury Fox[1] described contagious impetigo occurring in infants and children. He particularly drew attention to the vesicular form and little can be added to his description of the clinical manifestations of the disease. Numerous reports followed but it remained for Matzenauer[2] in 1900 to link together pemphigus neonatorum and impetigo contagiosa and to show that the causative agent was the Staphylococcus aureus. Sabourard[3] in the same year declared that the disease was a mixed infection due to streptococcus and staphylococcus, the latter being the secondary factor. In 1917 F. H. Falls[4] studied a number of cases of the disease in the Chicago Lying-In and Cook County Hospitals and isolated on culture the staphylococcus which was often grouped in short chains or appeared to be a diplococcus. He proved that this organism was the causative factor and to fulfill Koch's postulates he inoculated his own arm and obtained a distinct vesicle at the end of twenty hours. At the end of forty-eight hours the culture yielded the organism injected. Morphologically the characteristics of this organism have led to the assumption that the streptococcus and the staphylococcus were involved together. The diplococcic form was first seen by Demme[5] in 1886 but he did not connect this diplococcus with the staphylococcus; and Almquist[6] in 1891 stated that in the serum of the vesicles there were diplococci that proved to be Staphylococcus aureus when grown on culture media.

The disease also occurs in older children but we shall confine ourselves to the neonatal period of life. A number of epidemics have been reported in the last twenty years but it is universally accepted by obstetricians that the disease occurs sporadically in large maternity hospitals. Schwartz in 1908[7] at the New York Lying-In Hospital reported 27 cases with seven deaths. Cole and Ruh[8] in 1914 reported nine cases with one death. Biddle[9] in Detroit had a 30 per cent mortality in an epidemic that took place in the Woman's Hospital in 1911 and in 1914 at the same hospital a group of seventeen cases consisting of twelve babies, three nurses, two mothers with no deaths. Knowles[10] of Philadelphia reported a 33 per cent mortality in an epidemic of thirty cases. Falls reported from the Cook County Hospital forty-seven cases with two deaths and he states that the disease spread to several mothers and one nurse and that it was necessary to close the wards for a month. These reports make it evident that the disease is contagious not only to the babies but to those caring for them. Theoretically the transmission of the disease is by contact or inoculation but its contagiousness is similar to that of other infectious diseases of childhood. Falls cites an illustration of this fact: none of the women who were in the Cook County Hospital and were transferred to the Monroe Street Hospital showed evidences of the disease at the time of transfer or at any other time, yet nine children over two years of age with whom they came in contact in their new residence contracted the disease while the babies not in contact with the women remained free.

OUTBREAK AT BELLEVUE HOSPITAL

In the five years preceding 1922, sporadic cases appeared in the ward. The first case in the epidemic was seen March 8, 1922, in a baby eight days old. The following day the second case was reported in a baby five days old. Both of these children had a diffuse bright reddening and edema of the skin of the back that spread, gradually involving an area approximately 7 cm. in diameter over the scapulae. There were no circumscribed vesicles. The epidermis became loosened from the corium and there was a vesicular bulging of the former. The superficial skin appeared opaque and soon ruptured leaving the

livid corium exposed. At first it was thought, because of the peculiar location in both babies, that these might be burns due to hot water bags but as the bags were not used in the cribs after the day of birth it was apparent that heat was not the cause. The rapid spreading of the lesions and the angry appearance of the skin led us to suppose that erysipelas had developed in the burn. After consultation with the erysipelas service the babies were transferred to the contagious ward where they died some time later of malnutrition and at a time when the skin lesions showed a tendency toward healing. In the light of further developments it became evident that these cases were exfoliative dermatitis and exactly like the condition described by Ritter and called by him "dermatitis erysipelotosa." The third case developed four days after the first in a baby seven days old who had a small pustule on the neck which spread rapidly so that in a few days the neck was encircled with coalescing vesicles which later exfoliated. As it was about time for the mother to be discharged she insisted upon taking the child home. Two days later she reported at the clinic with the baby showing much larger areas of exfoliation. She refused hospital care and it died at home that night.

From this time on until November, cases developed but no other deaths occurred in the entire group. Practically all the cases appeared from the fifth to the eighth day of life. In the early stages, most of the cases showed coalescence of the vesicular area and the exfoliation spread chiefly under the arms and about the neck. Only one case had any vesicles or exfoliation on the trunk or legs, but a few had exfoliation on the arm and about the hand. There were several intervals of eight or ten days when no fresh cases appeared. As the epidemic progressed, the coalescence of the vesicles became infrequent except over small areas, their distribution was more discrete and their size only about one-half a centimeter in diameter. Finally, at the end of the epidemic, the blebs were but few in number and discrete. After the first three cases, the infants who were infected had no temperature, lost no weight, took their feedings in a normal manner and showed no evidences of irritation. Several premature babies were affected and progressed favorably in spite of the disease.

The individual lesion appears first as a small reddened area which develops a vesicular top within a few hours. At the end of forty-eight hours or less, the top of the vesicle containing turbid fluid shrinks over its summit and may then subside without rupture, or else it ruptures and the fluid runs out leaving exposed a moist red plaque surrounded by shreds of epidermis, the remains of the vesicle wall. On the other hand the lesion may spread quite superficially, losing its character as a vesicle with the result that an area of corium some 2 cm. in diameter may be covered with a wrinkled edematous surface. We noticed

early that the vesicles appeared to be autoinoculable and our treatment was directed toward maintaining the integrity of the vesicle wall.

Bacteriology.—Cultures were made from the blebs of a considerable number of the babies and for the most part Staphylococcus pyogenes aureus was found; occasionally, however, there were present what appeared to be streptococci and diplococci. Just previous to the epidemic there were several mild infections in the wards. On February 17, one infant had an infected finger; a few days later another child had a furuncle of the scalp and on February 28, eight days before the outbreak of the epidemic, there was another infected finger. These cases were not segregated and it occurred to us afterwards that these infections might have been the starting point of the epidemic. The anatomic structure of the skin of the infant is well adapted to the development of vesicular lesions and all infants showing paronychia or any other form of purulent inflammation should be segregated at once.

Attempts at Control.—Realizing the inoculability and infectiousness of the discharges from the vesicles, immediate steps were taken to isolate the patients. All babies with the disease were segregated in a room in another wing of the building and a group of nurses was assigned to care for these babies. As far as possible admissions were restricted to our regular clinic cases. It was difficult to determine whether or not overcrowding had anything to do with the continuation of the epidemic. The fifth month after the epidemic started and at a time when the disease was not so virulent, only a few vesicles appeared on any baby, and 135 mothers were delivered with an incidence of 64 per cent in the babies. In other words during the summer months the crowding and the heat seemed to lead to an increase in the number of cases. For a period of six months (February to August) there were 608 deliveries, 306 of which were males and 302 females, with 175 cases of the disease—89 of which were males and 86 females or a total incidence of 28.7 per cent. A comparison was made of the cases delivered by the different members of the staff to determine whether the infections were due to faulty technic on the part of any one man or to the possible fact that one individual was a carrier of the organism. It was found that the incidence was in the neighborhood of 25 per cent except for one man who had a 35 per cent incidence. This increased percentage might easily have been due to the fact that there were a larger number of infected babies in the ward at the time when his total of the deliveries was taken.

INTERNE	NO. OF CASES	% OF INFECTIONS
1	119	35
2	130	24
3	144	23
4	157	25

The record of the day and night shifts of the nursing staff was examined and it was found that there were approximately as many infections in the day cases as in the night.

	NO. OF CASES	NO. OF BLEBS	PERCENTAGE
Day	342	85	24.8
Night	314	90	28.6

It was the custom for the operator who delivered the baby to oil it and it was thought that possibly this maneuver carried on without change of gloves might be the source of the infection, especially as the skin around the neck and axilla where the creases are so often filled with vernix caseosa were the areas most frequently involved. Therefore the procedure was stopped and the babies were afterwards oiled by the nurses, a proceeding that made no change in the prevalence of the disease.

As a result of these observations we came to the conclusion that the infections did not occur in the delivery room. We made three changes in the location of the neonatal ward. The method of procedure was as follows: the new cases were received only in the new ward and the old nursery was gradually vacated by discharge of the babies already located there. A new set of nurses took on the duty of the newly opened ward. Following the closing of the room it was washed down with soap and water and cresol solution. These changes had no effect; new cases sprang up in the new ward as soon as the babies were five or six days old. Each infant as it showed evidences of infection was segregated in a separate room at some distance from the nursery and it was not taken into the common nursery at any time thereafter, although it was taken into the ward for the nursing period.

Transfer to Adults.—There were only two cases of transfer to adults. A nurse developed a bleb on her finger but it did not spread and healed in the course of ten days. One mother had a lesion on the breast just outside the pigmented area and she also developed one, later, on the buttock not far from the anus; both lesions healed in the course of a week.

Treatment of the Individual Child.—The principal factor in the treatment was protection from autoinoculation by preventing, so far as possible, the rupture of the vesicles and by bandaging areas involved so that the child's fingers would not come in contact with them. In the first month the lesions were painted with 50 per cent iodine and in a number of cases the blebs were punctured and the base painted with iodine. In a later group the blebs were painted with 3 per cent silver nitrate solution, and in still another 50 per cent calomel ointment was used. The ointment method was harmful as the vesicles spread beneath the film. Still later, the blebs were merely dusted with

aristol and bandaged and, finally, in the last fifty to seventy-five cases when the blebs had become discrete they were merely oiled with liquid albolene and a dressing applied.

DISCUSSION

This disease, of which we feel that we have had a larger series than has occurred in any other maternity hospital, is remarkable for the absence of mortality. No baby died of the disease in the ward, and the two infants that died in the contagious pavilion lived ten days to two weeks and their skin lesions were healing at the time of death. The third baby was practically untreated due to the lack of cooperation of the mother. The most interesting observation was that the illness was self-limiting with a tendency toward spontaneous recovery. Even when there was considerable exfoliation around the neck and axilla, the general health apparently was not affected and there was a normal return to the birth weight. We recovered the staphylococcus from many of the blebs and in those cases in which there appeared to be streptococcus and staphylococcus, we now believe there were short chains of staphylococcus or arrangements of the organism as a diplococcus. It is evident to us that the exfoliative dermatitis was nothing more or less than an extension of the vesicular type with exfoliation following, and therefore that exfoliative dermatitis and contagious impetigo in the newborn are the same disease; and we wish again to call attention to the conclusion of Matzenauer that pemphigus—a condition that we did not see in our group—and exfoliative dermatitis are the same. Therefore it seems probable that the three conditions are one and that the changing form depends upon the amount of exudation and the spreading of the blebs.

CONCLUSIONS

1. It is apparent that contagious impetigo and exfoliative dermatitis of the newborn are the same disease and are due to the Staphylococcus aureus.

2. This infectious disease is also contagious and has a self-limiting course with a tendency toward spontaneous recovery and the general health of the infant is but little affected.

3. It is probable that the best method of treatment is to paint the affected areas with sterile liquid albolene and to place aseptic dressings in order to prevent the rupture of the vesicles with the consequent autoinoculation.

4. The mortality in the 224 cases was 1.3 per cent and it is probable that death occurs only in those cases with considerable exfoliation and secondary infections.

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130 EAST FIFTY-SIXTH STREET. (*For discussion see page 266.*)

SOME OBSERVATIONS ON DYSMENORRHEA AT GOUCHER COLLEGE

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IN the *Journal of Industrial Hygiene* for June, 1923, Margaret Sturgis reported results of observations on dysmenorrhea occurring in women employed in a large department store. Her work at that time covered the record of some 2,077 women. She tabulated the degree of incapacity experienced by these women in industry. Four classes of dysmenorrhea or menstrual normal history were studied as follows, with symbols 0, 1, 1.2, and 2, used to designate the various classes.

0. Those who experience no discomfort. Those who feel a slightly lowered efficiency but who do their work without complaint.

1. Those who begin work and later are compelled to seek relief from a hot drink, medication or rest on a couch or bed with hot water-bottle.

1.2 Those who occasionally remain at home or go home during first day of period, but at other periods suffer little or moderate pain or discomfort.

2. Those who are compelled to remain at home one or more days of each menstrual period.

Among the various conclusions reached by Sturgis in her study on dysmenorrhea in these 2,077 women in industry, the following facts stood out:

65 per cent had no menstrual handicap.
30.6 per cent had slight menstrual handicap.
4.4 per cent had serious menstrual handicap.

As the medical records of Goucher students on entrance to college have been kept rather accurately for a number of years with reference to dysmenorrhea that incapacitates for work, it seemed worth while to make some study of these records according to the group classification of Sturgis. Three groups from early, middle and later periods in the history of the college were selected for comparison:

1. Students entering college 1900-1907 533
2. Students entering college 1917-1923 1516
3. Students in college 1923-1924 1023

Total number 3072

Chart 1 gives the numbers in each class according to the classification of Sturgis.

CHART I.

CLASSES BY YEARS	NUMBER OF STUDENTS	CLASS 0	CLASS 1	CLASS 1.2	CLASS 2
1900-1907	533	334	107	54	38
1917-1923	1516	1122	149	213	52
1923-1924	1023	882	128	9	4

Summary of Chart 1 by percentages is as follows:
Classes 1900-1907

No menstrual handicap ..... 62.6 per cent
Slight menstrual handicap ..... 30.3 per cent
Serious menstrual handicap ..... 7.1 per cent

Classes 1917-1923
No menstrual handicap ..... 74 per cent
Slight menstrual handicap ..... 23 per cent
Serious menstrual handicap ..... 3 per cent

Students in college during the year 1923-1924 whose records were based on time lost from work because of dysmenorrhea:

No menstrual handicap ..... 86.6 per cent
Slight menstrual handicap ..... 13.1 per cent
Serious menstrual handicap ..... .3 per cent

We find in these records a progressive advance towards menstrual normalcy. This advance is usually accounted for by freer clothing and more athletic life of women. We are inclined to believe at Goucher that a more sensible attitude in the mothers and a better mental attitude in the daughters is largely responsible for the gain.

The absences recorded from class work at Goucher for dysmenorrhea include those of Baltimore city girls under care of their own physicians and of resident students.

In the year 1923-1924, 142 students were absent 194 times. Analysis of time lost in these absences shows:

Loss of 2 days ..... 6 times
Loss of 1 day ..... 47 times
Loss of 1 hour to ½ day ..... 141 times

Total ..... 194 absences

Largest number of absences in one student	4
Number of students with 4 absences	3
Number of students with 3 absences	10
Number of students with 1 or 2 absences	129
Total number of students absent	142

Study was also made of the possible effects of college life on menstruation, comparing the records from 1920 to 1924, of presence or absence of dysmenorrhea on entrance with presence or absence of dysmenorrhea in college.

The following charts compare entrance records with dysmenorrhea in college.

CHART II.

GOUCHER STUDENTS 1920-1924	NUMBER OF STUDENTS	ENTRANCE RECORD, "DYSMENORRHEA ALWAYS"	NO ABSENCE IN COLLEGE	NOT MORE THAN ONE ABSENCE	TWO OR MORE ABSENCES
Senior	183	8	2	2	4
Junior	206	7	0	2	5
Sophomore	282	10	3	1	6
Freshman	352	14	6	4	4
Total number	1023	39	11	9	19

CHART III.

GOUCHER STUDENTS 1920-1924	ENTRANCE RECORD, "NO DYSMENORRHEA," "OCCASIONAL" IN COLLEGE	ENTRANCE RECORD, "DYSMENORRHEA OCCASIONAL"	NO ABSENCE IN COLLEGE	NOT MORE THAN ONE ABSENCE	TWO OR MORE ABSENCES
Senior	19	31	16	8	7
Junior	32	33	13	11	9
Sophomore	31	61	37	19	5
Freshman	18	64	45	17	2
Total Number	100	189	111	55	23

SUMMARY

Over against 100 who had never had dysmenorrhea on entrance but who developed occasional dysmenorrhea in college, we find the following figures:

Of 228 with a history of "dysmenorrhea always" or "occasional" on entrance, 122 show no absence in college for dysmenorrhea. Of the remainder, 64 have but one absence and only 42, two or more.

In none of the resident students from 1920 to 1924 has dysmenorrhea been of such a severe type that it was not relieved by rest in bed, heat and simple analgesics. Insufficient study of endocrine therapy at Goucher has yet been made for any conclusions of value on this form of treatment.

All students at Goucher must meet the requirement of three hours weekly in physical training or an assigned substitute. Sports such as golf, hockey, basket ball, baseball, tennis, swimming, dancing and horse-back riding are engaged in by those who are physically fit.

Most of the students with dysmenorrhea filled out questionnaires on their menstrual history and habits of personal hygiene. About half were assigned special exercises to develop the abdominal type of breathing.[1] Students with severe, persistent dysmenorrhea were referred to gynecologists for examination.

In looking for etiology in the occasional dysmenorrheas there is a tendency to draw *post hoc ergo propter hoc* conclusions. We can easily find types with poor posture, weak abdominal muscles, vasomotor disturbances, unhealthy tonsils, poor personal hygiene, poor nutrition or constipation. Improvement in one or more of these conditions may be followed by relief of dysmenorrhea, but an equal number of control cases in the college group may be found in which exactly similar conditions exist *without* dysmenorrhea.

Excluding a very small number of cases traceable to local pelvic disorders, the etiology of dysmenorrhea in this college group remains obscure. Let us take a few typical histories from the senior class:

R. B., city student, history of "dysmenorrhea always" on entrance. Constipation, underweight, poor abdominal muscles, unhealthy tonsils. Gained eleven pounds in college, posture improved. Only one absence for dysmenorrhea during four years in college.

S. M., resident student, history of "dysmenorrhea always," on entrance. Constipation, underweight, poor posture. Gained eight pounds. Two absences for dysmenorrhea in four years at college.

L. W., resident student, history of "dysmenorrhea always," on entrance. Underweight twenty-six pounds, poor posture, vasomotor disturbances. Little improvement in abdominal muscles in spite of special exercises. Gained ten pounds. Two absences for dysmenorrhea in four years at college.

D. W., city student, history of "dysmenorrhea always," on entrance. Poor posture and vasomotor disturbances. Improvement in posture. Three absences for dysmenorrhea during four years in college.

E. A., resident student, history of "dysmenorrhea always," on entrance. Vasomotor disturbances, weak abdominal muscles. Improvement in posture. No absences for dysmenorrhea during four years in college.

E. H., resident student, history of "dysmenorrhea always," on entrance. Weak abdominal muscles. Marked improvement in muscles. No absence for dysmenorrhea during four years in college.

P. L., resident student, history of occasional dysmenorrhea, on entrance. Poor posture, large unhealthy tonsils, vasomotor disturbances. Tonsils removed in 1923. No absence for dysmenorrhea in four years at college.

C. C., resident student, history of occasional dysmenorrhea on entrance. Poor posture, unhealthy tonsils, poor nutrition. Tonsils removed July 1922. Gained eleven

[1] *Mosher, C. D.:* Jour. Am. Med. Assn., April 25, 1914, lxii, 1297-1301.

pounds. Posture improved. No absence for dysmenorrhea after summer 1922. One in first year.

M. H., city student, history of occasional dysmenorrhea, on entrance. Circulatory disturbances, weak abdominal muscles, poor personal hygiene. Above conditions improved. Three absences for dysmenorrhea during four years in college.

H. N., city student, history of occasional dysmenorrhea, on entrance. Weak abdominal muscles, vasomotor disturbances, poor personal hygiene. Improvement in above. No absence for dysmenorrhea in four years in college.

A. V., resident student, history of occasional dysmenorrhea, on entrance. Weak abdominal muscles on entrance, poor personal hygiene. "Afraid of being fat." Underweight. Lost eleven pounds. Posture improved decidedly. Three absences for dysmenorrhea in fourth year at college.

L. L., resident student, history of occasional dysmenorrhea on entrance. Underweight, weak abdominal muscles, unhealthy tonsils. Gained seven pounds after tonsils were removed. Posture improved. No absences for dysmenorrhea in four years in college.

M. G., resident student, history of occasional dysmenorrhea, on entrance. Posture good, tonsils unhealthy, vasomotor and circulatory disturbances, poor personal hygiene, poor nutrition. Gained four pounds. No absence for dysmenorrhea in four years in college.

M. C., resident student, history of occasional dysmenorrhea on entrance. Tall thin type, poor posture, vasomotor disturbances, "always tired." Abdominal muscles improved. Three absences for dysmenorrhea during four years in college.

M. C. C., city student, history of occasional dysmenorrhea, on entrance. Had freshman year at another college where she went in for athletics. Spent two hours daily on train coming to Goucher. Little time for athletics. Slump in posture. Four absences for dysmenorrhea during three years at Goucher.

A. E., city student, history of "dysmenorrhea always," on entrance. Good posture, bad personal hygiene. Irregular eating and sleeping. "Afraid of getting fat." Thought she must go out every night for entertainment. No dysmenorrhea at camp in summer. Dysmenorrhea always at other times. Three absences in four years at college.

V. K., city student, history of occasional dysmenorrhea. Constipation, chronic appendix trouble. Vasomotor symptoms, good posture. Constipation improved. Six absences during first three years for dysmenorrhea and two in last year.

H. L., city student, history of occasional dysmenorrhea on entrance. Some toxic symptoms, posture good. Lost four pounds in weight, slumped in posture and personal hygiene. Four absences for dysmenorrhea in four years in college.

M. R., city student, history of occasional dysmenorrhea, on entrance. Toxic symptoms, chronic appendix trouble, poor personal hygiene, good posture. Five absences for dysmenorrhea in four years in college.

M. L., resident student, history of occasional dysmenorrhea, on entrance. Weak abdominal muscles, vasomotor disturbances, poor personal hygiene. Posture not much improved. Four absences for dysmenorrhea in four years in college.

B. L., city student, history of occasional dysmenorrhea, on entrance. Very poor posture, poor nutrition, vasomotor disturbances, poor personal hygiene. Posture improved. Gained five pounds. One absence for dysmenorrhea in four years.

M. R., resident student, history of occasional dysmenorrhea on entrance. Weak abdominal muscles, poor posture. Thought special exercises helped her. Two absences for dysmenorrhea in four years.

While weak abdominal muscles appear to be the most common finding in these cases, some students with perfectly good muscles report occasional dysmenorrhea.

In all the student interviews an attempt was made to change the student's attitude toward herself. One in her freshman year admitted that she was glad of an excuse to stay in bed with dysmenorrhea and get out of the rush of college life once a month. Others admitted that they were always expected to go to bed at home; their mothers did before them. Some became ashamed of this record.

Is not the improvement in dysmenorrhea to be traced rather to a stiffening in "back bone" than abdominal muscles; to the development of a point of view that looks with scorn upon a life of physical handicap?

Undoubtedly the satisfying and interesting life which most college girls enjoy makes them eager to have good health. If, in working for improvement in general health and hygiene their dysmenorrhea improves, how shall we determine whether it is special exercises or mental attitude that effects the cure?

RECENT ADVANCES IN OUR KNOWLEDGE OF OBSTETRICS AND THEIR BEARING ON OBSTETRICS AS A SPECIALTY*

By A. J. Skeel, M.D., Cleveland, Ohio

AVAILABLE data on maternal mortality and morbidity in obstetrics not only show slight improvement in recent years, but reveal the fact that when we put our statistics beside those of other highly civilized countries, we occupy a position near the foot of the list. This of course, does not demonstrate conclusively that we are not improving our obstetric art.

Could similarly accurate criteria be presented for late maternal invalidism, for injuries to the child at birth, for craniotomies and embryotomies, for decrease in the number of stillbirths, etc., we should unquestionably be able to show marked improvement.

In the larger medical centers more careful supervision of pregnancy has definitely reduced the incidence of eclampsia. The fact is, that in recent years attention has been focused on the baby and its welfare more than on that of the woman. Moreover, recent improvements on behalf of the mother have been directed toward the prevention of morbidity, rather than toward the reduction of mortality. The prevention of eclampsia, of course, improves the figures for both the mother and child.

Cesarean section has been rendered quite safe, but this change has

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improved the infant's chances much more than that of the woman, since we now elect to do a cesarean operation where formerly craniotomy or embryotomy was performed.

Our supposedly slow progress in the last two decades has therefore been more apparent than real, because it has been made along lines not so readily revealed by statistics, as is that of maternal mortality.

Vesicovaginal fistula, formerly so common, was until recently the cause of untold suffering among childbearing women. Thanks to improvement in the art of the accoucheur this condition has become quite rare.

Serious injuries to the baby's head caused by the application of high forceps, as well as the irreparable damage frequently done to the mother by the same procedure, have practically disappeared from the practice of the obstetric specialist, but still not infrequently occur at the hands of the family physician.

Third degree perineal lacerations whether due to narrowing of the pubic arch, or to lack of care and skill in the use of the forceps, rarely happen today under the care of the skilled obstetrician. This injury is still disappointingly frequent in general practice. Lack of surgical skill prevents the general practitioner from repairing injuries to the cervix and upper genital tract at the time of delivery, while pelvic floor injuries involving the levatores ani are as a rule very poorly handled by him.

Failure by the general man to make an early diagnosis of complications of labor, such as prolapsed cord, malpositions and presentations, and obstructing tumors, result in the neglect of timely life saving measures, and is the cause of countless obstetric tragedies.

The inability of the untrained accoucheur to competently handle the obstetric emergencies, such as placenta previa, postpartum hemorrhage and ablatio placentae, adds materially to the list of mortalities and increases the morbidity.

Failure to make early diagnosis of disproportion and faulty diagnosis of the station of the head in the pelvis, lead to ill-chosen attempts at delivery with ensuing complications that the best surgical skill can only palliate.

Attempts by the man of only average training to imitate Potter in his method of version, to follow DeLee in his plan for prophylactic forceps with episiotomy, or to do an untimely or ill-considered cesarean section, produce grave consequences that serve to still further emphasize the ever widening gap between obstetrics as practiced by the family physician, and the same art at the hands of the skilled obstetrician.

Recently DeLee has been urging that the classical cesarean operation be discarded, and that trachelolaparotomy be substituted for it in all cases. His figures show a decided reduction in maternal mortality by the use of this method of incising the lower uterine segment rather

than the upper one. The greater technical skill required for this operation forbids its use by the unprepared man, a circumstance which may fortunately result in the prevention of some of the frequent deaths now occurring from the classical operation, when performed by men of untrained obstetric judgement.

Transfusion of blood in cases of hemorrhage, a measure frequently resorted to by trained men working in adequate institutions is still another illustration of the surgical procedures demanded in obstetric practice. It is obviously impossible in family work.

I hope not to be misunderstood or misinterpreted. All honor to the family doctor, who cares for confinement cases, under all sorts of poor surroundings, at all hours of day and night, with poor light and untrained help. It is surprising that his results are as good as they are.

I do however wish to emphasize that obstetrics has become a surgical specialty, that the recent advances in obstetrics are practically all surgical, and that surgery of such a type as to demand the highest grade of technical skill, and the broadest and best trained surgical judgment. Whether all this surgery is well or ill-advised is another question. Often to refrain from operative interference requires infinitely more knowledge and experience than is needed to operate. The fact remains that trained surgical skill and comprehensive judgment and experience are prerequisite to modern obstetric practice of the best type.

Two plans present themselves for bringing to the patient this greater technical knowledge and skill demanded by modern methods.

One is to give to the average family physician better training than he formerly received. He handles the great mass of deliveries for the patients of modest means. By the efforts of various interested organizations much has been accomplished in this direction. No one who has had the opportunity to compare the work of the modern medical graduate with that of the men who began twenty or even ten years ago can fail to see the improvement produced by the better teaching of today. This will in time of course be reflected in our statistical data, and is of paramount importance.

The second method available is to bring the service of men already expert to a larger number of women. Indeed the primary purpose of the present paper is to urge the necessity for increasing the actual producing capacity (if one may be permitted to use a commercial term) of each specialist, so that more women may benefit by his skill. This seems particularly desirable for the great middle class, to whom for financial reason, such service is at present unattainable.

Anyone who has considered our present system of conducting private obstetric practice must be impressed with the tremendous economic waste involved. I think you will all agree that the doctor engaged in this specialty is a very busy man if he accepts thirty cases per month, or an average of one a day, even if his work is limited to hospital de-

liveries. Although he may have an obstetric resident, and a well organized service, still his patient expects him to be within immediate call over a considerable period of time. This time must be spent at the hospital although the doctor may have no other work demanding his attendance there. Not only must he spend hours in this unprofitable way, but exactly as many of these hours are between ten p. m. and seven a. m., as between ten a. m. and seven p. m. To put the matter briefly, the number of patients that the obstetrician can accept is rigidly limited by his physical capacity for losing sleep, rather than by the amount of work that he could do, were the cases presented to him during a definite portion of the twenty-four hours. As we have previously stated, thirty deliveries per month makes a full schedule under these circumstances. If we compare such a schedule with that of the busy surgeon the contrast becomes at once apparent.

Why can the surgeon develop his clinical work to the point where he actually operates thousands of cases yearly, while the obstetrician must number his by hundreds? Why can he have material for inquiry, research and experience which makes him master of his art, while even the hardest working obstetrician is comparatively inexperienced? This is due entirely to the fact that the surgeon has so organized and systematized his work that he can go into his operating room in the morning, and with a corps of trained assistants he can remain continuously at work until finished. Some emergencies, it is true, must be done at night. But if for every six hours of daytime surgery he were obliged to do six hours of night operating, I believe even the most ambitious surgeon would decidedly reduce his daily quota.

This factor which so definitely limits the work of the obstetrician, not only brings the cost of his services beyond the means of the average patient, but it unfortunately seriously hampers him in the acquisition of experience and technical skill.

What surgeon could gain a reputation for great knowledge if he operated an average of one case daily? Not only is the obstetrician thus limited, but the majority of his cases are normal or nearly so, and consequently play a minor part in developing his diagnostic ability or improving his surgical skill.

The writer wishes to urge the adoption, in our larger centers of population, of a definite plan for so conducting obstetric practice, that a larger number of women, in modest circumstances, may be delivered by the expert accoucheur. This could be accomplished by the grouping of experienced obstetricians for this purpose, each man retaining his own patients who are able to pay for individual service. The plan would require at least two and perhaps three experienced men in the group, who could arrange for alternating the hours on duty to suit their convenience. Two men might alternate day and night service every other month. Any obstetrician could readily care for one or two extra patients daily, if the actual delivery occurred during his hours

on duty. Thus the patients of the group would be divided into two distinct classes.

1. Those financially able to command the service of the individual obstetrician, whether by day or night.

2. Those to be confined by the one of the group who happened to be on duty at the actual time of delivery.

Such a plan would serve the twofold purpose of great reduction of cost, to those least able to pay, while it would give to the accoucheur increased opportunity for his own technical improvement.

As the clinic developed reputation, pathologic cases would be referred more frequently. At such a clinic it would be possible to entertain a colleague at any time, with the assurance that he might observe actual operative procedures and newly developed methods, as surgeons habitually do. The development and training of younger obstetricians would be efficient, practical and thorough.

Such a plan the author believes would be a boon to the women whom it served, and would help to answer the criticism that we are not reducing sufficiently the mortality and morbidity of childbearing.

309 Osborn Building. (*For discussion see page* 263.)

INSTITUTIONAL ANTEPARTUM METHODS APPLIED TO PRIVATE PRACTICE*

By James A. Harrar, M.D., New York City

THE extensive adoption of early antepartum care by various institutions, both lay and medical, has produced the most permanent advance in obstetric progress of recent years. By systematic use of simple routine procedures, beneficial results are being tabulated, the repeated recital of which cannot but attract the attention of the profession at large as to their value. Evidence is everywhere apparent to obstetricians that the chief obstetrical care of the average pregnant patient prior to the onset of labor consists in little more than entering her name upon the books. Physicians frequently are negligent in giving definite advice and in insisting upon return visits at proper intervals, and, if the woman looks healthy, in trusting to nature instead of to blood pressure readings and urine examinations.

While the active duties of the doctor during labor are of the ultimate importance to the welfare of the woman and her baby, we perhaps have not gone far enough in discussing the necessity of the anticipatory duties during pregnancy. We now group these anticipatory duties of the accoucheur under the heading of "prenatal care," an evolution of the old antepartum examination. By whatever name we

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call these services to the patient, proof is not lacking from many sources of the advantage of starting obstetric care at the beginning of pregnancy and continuing it up to term. Individuals have recognized this for years. A quarter of a century ago in an admirable article on the management of labor in private practice, Allen M. Thomas said, "It is in these wise directions and forethoughts for the anticipated labor that the science of modern obstetrics especially excels, and too much stress cannot be laid upon their routine practice."

At the New York Lying-in Hospital we admit emergency cases in labor as well as regular applicants who have received more or less prenatal care. For twenty-five years the chief service to the patient in the antepartum clinic has been the examination in the latter months. Two years ago follow-up visits were initiated, and for the past nine months the clinic has been conducted with intensive prenatal detail. The women are encouraged to apply early in pregnancy. Formerly they were postponed except for abnormality and told to return in the seventh month for examination. As soon as these women learned of the possibility of early registration and obstetric care they took prompt advantage of the opportunity. The daily attendance at the antepartum clinics has more than doubled in the past two years.

At the first visit—with obstructive clothing removed—the woman, properly draped, is subjected to the customary complete antepartum examination, including urine, blood pressure and the securing of blood for a Wassermann test. Instruction in hygiene and mode of living is given by the nurse while the patient is waiting for the examination, this instruction being completed, after the examination, to include advice toward the correction of any abnormalities found. Monthly visits before the sixth month and fortnightly visits after the sixth month are requested in normal pregnancies. If a patient fails to return at the appointed time, first a letter and then a nurse is sent after her. In abnormalities, especially of urine and blood pressure readings, more frequent visits are required at the judgment of the doctor. The records of the complete antepartum examination and all the notes on the return visits go to the delivery room with the patient on admission to the hospital, or on the out-door service to the patient's home in the tenements with the labor bag.

This naturally has necessitated a big increase in the demands on the laboratory and on the doctors' and nurses' time, but we have already profited to the following extent. The incidence of recognized severe toxemia as expressed in cases admitted to the wards for treatment has increased. In 1919 there were nine; in 1920, eleven; in 1921, twenty-eight; in 1922, forty-two; in 1923, thirty-one; and in the first six months of 1924, twenty-eight. While we have been discovering and recognizing more toxemias, we find to our great satisfaction the incidence of the convulsive type, eclampsia, has extraordinarily decreased. Formerly we would have forty and fifty cases every year,

but in 1919 we had but twenty-seven cases; in 1920, twenty-three; in 1921, twenty-two; in 1922, eight; in 1923, thirteen; and in the first nine months of 1924, nine. Perhaps an eclamptic convulsion can come without warning, but in a pregnant woman whose careful prenatal instruction has taught her proper living and on whose urine and blood pressure timely observations have been made, it is extremely rare. During six months in 171 emergency labors, one in every eighty-five had eclampsia, while in 2,515 regular applicants in the same period who had more or less prenatal care, only one in every four hundred and twenty had eclampsia. The latter all gave warning signs of a developing toxemia. We can by no means always prevent eclampsia, but we usually can anticipate its occurrence.

Analysis of our results show the stillbirth rate in the regular applicants with prenatal care to be but one-fifth of that in the emergency cases. A further study of stillbirths in both groups exhibits an equal diminution in delivery mortality, in macerated fetuses, and in babies lost by reason of prematurity. The delivery mortality in hospital obstetrics is, theoretically at least, approaching a minimum. Further refinements in method and perhaps new and more perfect operations for dystocia may come, but care and judgment in following the present known procedures should insure results approaching this minimum delivery mortality. The number of babies lost, however, by reason of prematurity, and the cases with macerated fetuses present an appreciable total toward the reduction of which we are still working. While the prognosis and treatment of pregnant women with positive Wassermanns is a big problem in itself, still to be solved, we also frequently find premature macerated fetuses with repeated negative Wassermanns in the mother. Some of these are due to toxemias, others to early cord accidents, monstrosities, and pathology of the placenta. As in the delivery mortality, here too will continue to be found a certain number of unavoidable stillbirths.

Vaginal smears for gonococci are taken in suspicious cases. Ophthalmia neonatorum is not the only serious complication for the baby in maternal gonorrhea. Some years ago I, in collaboration with R. W. Lobenstine, found in the babies of fifty mothers with active gonorrhea, the birth weight to average 300 grams below normal, the initial weight loss to be greater, and the time of return to birth weight longer than in babies born of normal mothers or even of mothers running a febrile course nongonorrheal in origin. It was also observed that babies were prematurely born in 22 per cent of gonorrheal mothers as opposed to our normal prematurity rate of 2.35 per cent. Discovery of either syphilitic or gonorrheal infection in the pregnant woman is at least indication for prompt and vigorous treatment.

Now if these are the results of instituting early obstetric care, and we have every reason to believe they are, surely physicians who fail to heed them are practicing slovenly obstetrics. Aside from the Was-

sermann test which in private practice will have to be adjusted to the individual clientele and employed with discretion, there is nothing that cannot be done by the average man in his own office. The equipment is simple. With a good pelvimeter, no other instruments are required that should not be in every doctor's hands. Much of the stock advice can be handed to the patient on a printed slip easy to obtain. Several simple and readable books on the subject may be procured for patients desiring them. It is office work. The time required is not excessive and who would not gladly spare it could one stillbirth or one case of eclampsia be avoided? Again, how much more can be accomplished in private practice, where the doctor's contact with the patient comes so much earlier, and the observations and the examinations are made by the man who will personally attend the confinement? Where the vaginal examination in the early months, for instance, can detect a possible retroversion of the pregnant uterus—a not infrequent cause of early abortion—manual correction of the retroversion, if necessary under gas anesthesia, and the wearing of a pessary until life is felt will usually prevent a miscarriage.

Another opportunity is that for the discovery and supervision of patients with heart disease. Every obstetrician should be acquainted with the signs of the usual impairment of functional efficiency of the heart in normal pregnancy; the slight breathlessness on exertion, chiefly on ascending an incline, and the tendency toward stasis at the bases of the lungs with crepitant râles that clear up on deep respiration. He should be able to recognize and discount the physiologic phenomena toward term, of basal systolic murmurs and displacement of the apex upward and to the left. With such knowledge he will be able to guard the potential cardiac against breakdown in compensation during pregnancy, the prevention of which will insure a safe delivery in the great majority of these women.

I need not dwell upon the abdominal palpation in the latter months, the observations upon the growth of the uterus and the position of the child, the pelvic measurements and the estimation of the internal shape and capacity of the entire birth canal, and the frequent urine and blood pressure examinations. The relief of minor discomforts, the cleanliness of the nipples, the manipulation of the flat and inverted ones, the necessary advice on balanced diet, frequent bathing, sufficient rest, proper exercise, clothing, and daily evacuations of the bowels; the defining of the danger signs of impending toxemia and miscarriage, the description of the onset of labor, together with the quizzing at the successive visits on the following of advice of the former visit, all go to the building up of a relationship between doctor and prospective mother that is invaluable. In no other branch of medicine does the patient suffer so long in the presence of the physician as when in childbirth, and in no other ordeal of her life is the confidence of the woman in her doctor put to a more severe test. This confidence will be estab-

lished by the repeated advice and encouragement offered at the antepartum visits.

In Thomas's article, previously mentioned, he adds:

"A wholesome general surveillance of the patient is continued throughout her pregnancy and her mental condition made a special object of solicitude. A good morale is instituted both by intelligent instruction of the patient, especially if she be a primipara, and thoughtfully shielding her from, or laughingly dispossessing her mind of all obstetric gossip; frequently reassuring her against demoralization from the instinctive fears and apprehensions for her safe delivery. The fact of the nobility of her undertaking is impressed upon her; wholesome pride inculcated in it, and she is quietly urged to a desirable reliance upon herself for its accomplishment."

100 East Sixty-sixth Street. (*For discussion see page* 264.)

MALIGNANT ENDOTHELIOMA OF PERITHELIOMA TYPE IN THE OVARY*

By Edgar F. Schmitz, M.D., F.A.C.S., St. Louis, Mo.

(From the Gynecological and Obstetrical Department of St. Louis University School of Medicine.)

IN presenting this case of malignant endothelioma of perithelioma type in the ovary, I am fully aware of the skepticism which some writers seem to have toward the very existence of such a pathologic entity.

The literature on the subject is extremely scant and confused; the histologic descriptions tremendously involved and the opinions expressed varied and shifting.

There is no doubt that many of the earlier tumors described as endotheliomas were in reality carcinomas or sarcomas, but since the very critical discussions of several authors, notably Ribbert and R. Meyer, more conservatism has been manifest in making this diagnosis.

The difficulty lies in the fact that these growths present a conglomerate cell picture and structure, which tend toward a sarcomatous or carcinomatous type, and make the personal equation a predominant factor in their interpretation, and the additional obstacle exists that perfectly clear-cut cases are rare indeed.

In a discussion of these tumors we are confronted with a series of tissue changes which must be studied from two angles before any conclusion as to the nature of the growth can be arrived at. First,

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the histogenesis of the malignant cells, and second their morphologic characteristics.

Perhaps a short review of the development of endothelial tissue would help toward a clarification of the changes involved, and in some measure explain the dual characteristics of the cell picture.

In the embryo, mesoderm lies between ectoderm and entoderm and owes its origin to cells, which have split off from both of these layers. Subsequently the mesoderm splits into several divisions, one part differentiating to form kidney and uterus with their epithelial secretory structure; another produces muscle and connective tissue, and lines the body cavities; a third groups itself around a central canal and ultimately goes to form heart, blood and lymph vessels, and their respective linings.

We see then that the cells which line the blood and lymph vessels are derived from a tissue (mesoderm) which has a common origin from primitive layers, which form epithelial structures, while the mesoderm in addition forms connective tissue, etc.

Thus endothelial cells are intermediate between epithelium and connective tissue, and the dual tendencies of these cells, under pathologic conditions, to approach one cell type or the other, becomes clearer.

In these tumors two morphologic characteristics may therefore be expected. First, those changes which approach to a greater or lesser degree the sarcoma type; and secondly, those that more closely simulate carcinomata. Histogenetically, both types of cells must be derived from endothelium.

Following a rigid critique of these peculiar tumors by several investigators, grave doubt has arisen as to the existence of any genuine endothelioma of the ovary. Ribbert has stated, that the endothelial origin of any ovarian tumor while possible is unproved, and R. Meyer is disposed to discard the entire group, but still admits that such tumors can exist.

Feeling that I have in my possession sufficient autopsy and microscopic evidence to warrant a diagnosis of malignant endothelioma of perithelioma type in the ovary, I herewith present the following case:

M. L., age seventeen, colored, married, entered the hospital on January 13, 1923, with the following history:

Two months previous to admission, she had noticed that her abdomen was slightly distended. This enlargement was progressive and rapid, and pain, which began shortly after the symptoms were first noticed, became more severe.

The menstrual history was perfectly normal, the last period having occurred two weeks before admission, lasting four days, with only a scant flow.

She had one child, living and well, twenty months old; no miscarriages, no operation, no serious previous illness.

The physical examination showed a well developed, well nourished female, with a markedly distended abdomen, due to a firm tumor mass, which extended well above the umbilicus on the left side, and completely filled both lower quadrants.

Pelvic examination showed the cervix adjacent to a mass from which the corpus uteri could not be outlined. The tumor completely filled the pelvis and extended high into the abdomen, as previously described. No fluctuation could be elicited. The percussion note was dull, and the growth could not be moved. Wassermann, plus; leucocytes 12,800; urine negative.

Preoperative diagnosis, ovarian cyst. The patient was operated on January 19, 1923, with the following findings: free fluid in the peritoneal cavity. A large tumor, with glistening bluish-white surface, appeared in the wound. The uterus was pushed forward by this mass and lay immediately under the peritoneum. Two distinct growths could be palpated when the hand was placed in the abdomen, one to either side of the uterus, the right being much the smaller. The tubes on both sides were tightly spanned across the tumors and no normal ovarian tissue was visible.

An attempt was made to raise the mass, but the tissue began to tear badly. A trocar was next inserted to draw off some fluid, but only a few drops were obtained. The broad ligament was now split, and an attempt made to shell out the tumor. This proved to be impossible, as the tissue crumbled and came away in handfuls, with severe bleeding. Because of the nature of the mass—it was evidently malignant

Fig. 1.—Mass protruding through abdominal wound twenty days after operation.

—it was deemed inadvisable to go further with the operation. The tumor cavity was packed with gauze, the end of which was brought out through the abdominal wound, and the abdomen closed. No evidence of metastatic or extension growths was noted on the peritoneum, or visible intestine at this time.

Postoperative diagnosis, bilateral ovarian cyst, malignant.

On January 22, the gauze pack had been entirely removed from the wound. On January 27, eight days after the operation, the neoplastic growth was seen pushing its way upward through the wound. On February 8, the mass had reached the size which is seen in the accompanying photograph. (Fig. 1.)

On February 10, she received her first dose of deep x-ray therapy, which had no effect on the growth. February 28, one month and fifteen days after entering the hospital, the patient died.

In the meantime, a pathologic examination of the material removed at operation had been made by two pathologists, and both independently reported, perithelioma.

A very careful autopsy examination was made, which revealed the following findings, which for sake of brevity, have been summarized.

There was an unhealed incision in the mid-line, through which a soft succulent tumor mass, about the size of a large orange protruded. This growth proved to be an extension or metastasis of the primary tumor in the mesentery, and was sur-

rounded on three sides by small intestine. The adjacent gut was adherent, black, and gangrenous. The abdominal cavity contained 100 c.c. of a milky white fluid, and metastases were seen growing throughout the belly. The pelvis, and a good part of the abdominal cavity, was filled with a growth which was white, soft, succulent, brain-like, and easily torn off, even in the customary manipulations. This tissue so completely filled the pelvis that anatomical relationships were lost. The uterus was well forward, the posterior surface seemed congested, and had an inflammatory appearance. On section the uterine cavity and wall appeared negative, except for the thickened serosa, just mentioned.

It was impossible to demonstrate the adnexa on either side, so completely had the growth obliterated all anatomical structures.

The stomach was negative; small intestine showed an area of gangrene, and many metastatic or extension growths. These same growths were found on the large gut, which was also displaced, due to tumor pressure.

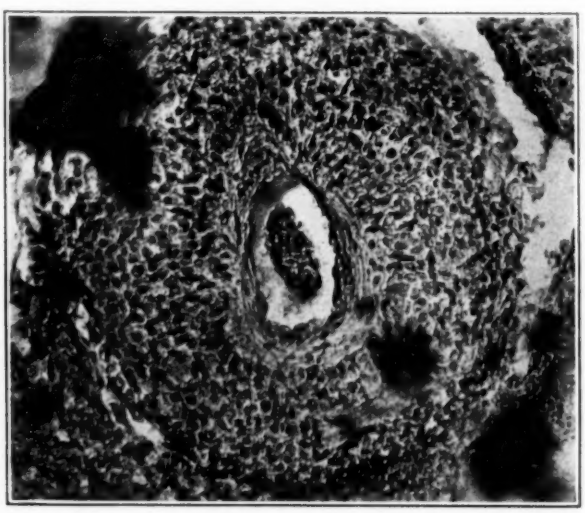

Fig. 2.—Tumor cells almost completely replacing vessel wall, assuming an epithelial character.

The liver, pancreas, heart and thyroid, were negative. Chronic passive congestion of the lungs was seen, together with a pulmonary embolus on the left side. The kidneys showed cloudy swelling, and the ureters indicated changes which were due to chronic obstruction.

Causes of death were—(1) perithelioma, (2) pulmonary embolism; (3) chronic peritonitis; (4) gangrene of the intestines.

I have presented at some length the autopsy findings in this case, because it is important to rule out any tumor growing elsewhere in the body, and secondarily invading the ovary. Such neoplasms have caused considerable confusion in the literature, especially those arising in the stomach.

In discussing the histologic appearance of the various sections taken from the tissue in this case, several striking features present themselves, on which the diagnosis was made.

First, the peculiar and intimate relationship of the cells to the blood

vessels; in some areas, these tumor cells almost completely replace the vessel wall, assuming an epithelial character, causing a proliferation of the endothelial cell lining, and arranging themselves in stratified layers in a radiating fashion about the lumen (Figs. 2 and 3). Or,

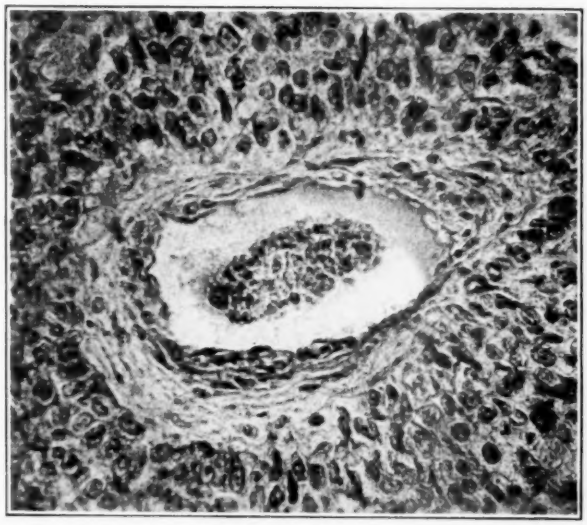

Fig. 3.—Higher power of Fig. 2, showing character of cells and endothelial proliferation.

Fig. 4.—Grouping of cells about blood vessels.

they arrange themselves in whorls or chain-like formations of several layers about other vessels, again causing proliferation and desquamation of the lining endothelium, which swollen and enlarged endothelium, takes on the character of the tumor cell, and seems to blend gradually into this cell type (Figs. 4, 5 and 6).

In other sections the tendency toward vacuolization can be distinctly seen. These vacuoles seem to form in the cell cytoplasm, and gradually coalesce with one another to form irregular spaces and

Fig. 5.—Concentric chain-like formation; proliferation of endothelium which takes on character of tumor cells.

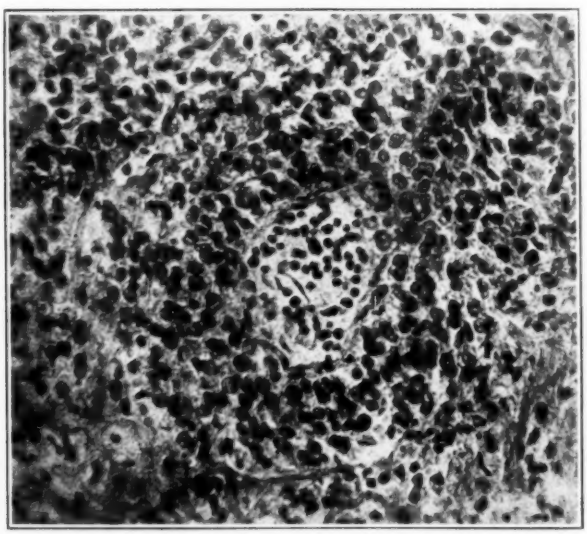

Fig. 6.—Stratified, radiating cell formation about thrombosed vessel.

channels which the tumor cells endeavor to line, at the same time in places taking on the original elongated endothelial characteristic (Fig. 7).

Again we have portions of the tumor which are striving to assume a cell structure which closely resembles the sarcomatous type, although the polymorphic cell picture still predominates (Fig. 8).

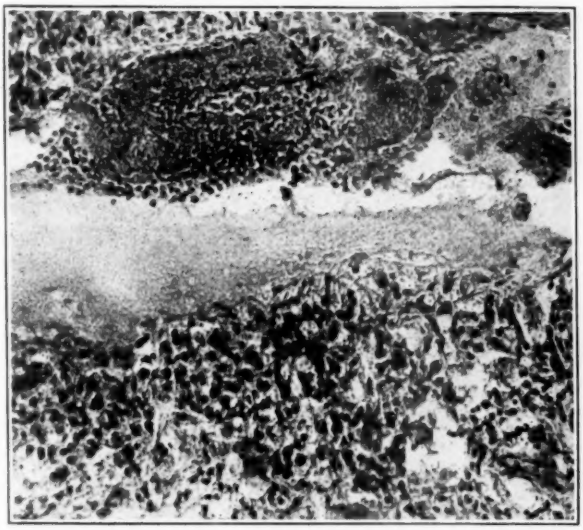

Fig. 7.—Vacuoles coalescing to form spaces which endothelial tumor cells endeavor to line.

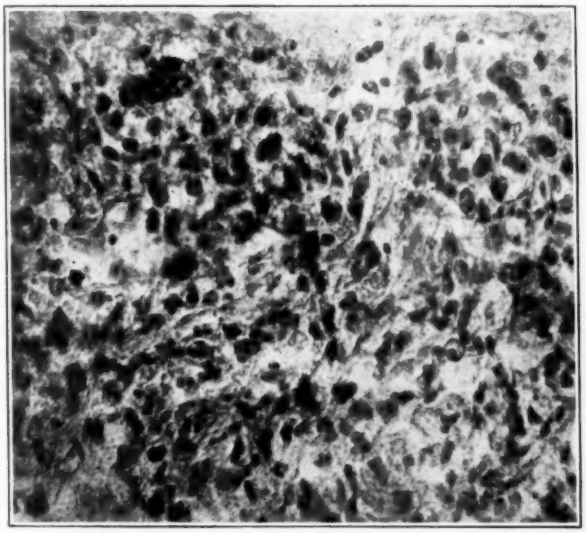

Fig. 8.—Tumor cells assuming a structure closely resembling sarcoma.

Finally, we have one slide which shows a structure such as I have been unable to find described in any text. A careful search of the literature failed to produce an illustration which even faintly resembled it. In Figs. 9 and 10 a vessel can be seen whose wall has been almost entirely replaced by cells of endothelial tumor type, the lumen being

preserved. In the wall, however, some five or six clear spaces present themselves which are surrounded by cell clusters in radiating or ring-like formation, which seem to spring from these spaces. These clefts I have taken to be the lymph channels in the vessel wall which have

Fig. 9.—Tumor cells surrounding lymph spaces in vessel wall.

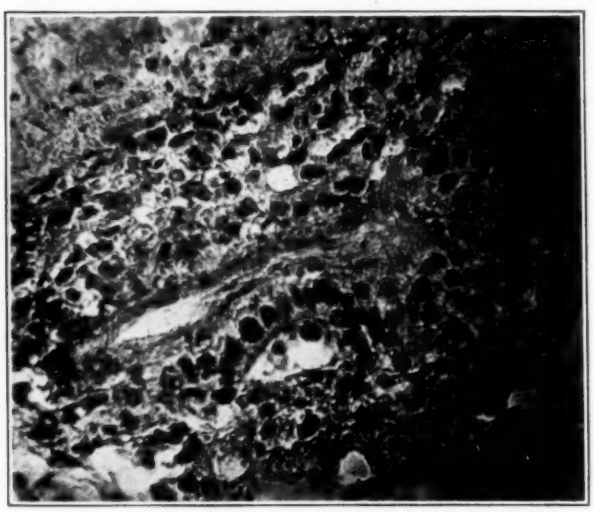

Fig. 10.—Higher power of Fig. 9. Vessel lumen well preserved.

become markedly dilated, and from which the actual tumor growth seems to arise.

All of these varied pictures occurred in three sections, two of which were taken from the tissue removed at operation (Figs. 2, 3, 7, 8, 9 and 10) the third being from an extension or metastatic growth in the small bowel (Figs. 4, 5 and 6).

That this tumor was located in the ovaries seemed perfectly clear to me at the time of operation, for the masses on both sides still roughly resembled the ovary, both in contour and position. One could clearly see both fallopian tubes stretched across the anterior surfaces of the tumors from which they could be easily separated. Had the tumor come primarily from a structure in the broad ligament, I feel certain that some vestige of an ovarian structure would have been visible on one side or the other.

We have then, a growth which tends toward a sarcomatous and carcinomatous type in one and the same section, which arises from the endothelium of the lymphatics, arranges itself in concentric, perivascular cell groups, has the polyhedral or cuboidal, always polymorphic cell type, and is of a malignant character.

The arrangement in whorls or chains, the tendency to formation of vacuoles which coalesce to form new spaces, seemingly lined by tumor cells, all these points seem to indicate that the diagnosis of malignant endothelioma of perithelioma type, is here justified.

I am deeply indebted to David H. Dolley, Professor of Pathology at St. Louis University, for his kindness and help in the study of the pathologic material presented in this paper, as well as for the original tissue diagnosis.

I wish also to express my thanks to H. P. Muir, now of University of Missouri, Columbia, for his painstaking and very complete autopsy report, and to C. W. Schery, of the City Hospital, for his examination of the original tissue in the diagnosis of which he independently confirmed our findings.

501 Metropolitan Building.

CONTRACTIONS OF A NONPREGNANT MULTIPAROUS HUMAN UTERUS

By M. Pierce Rucker, M.D., Richmond, Va.

A NUMBER of observers, notably Kehrer,[13] Franz,[6] Keiffer,[14] Jacub,[12] Fellner,[4] Langley and Anderson,[17] Gunn,[8] Dale,[3] Blair,[1] and Keye,[15] have published studies of the contractions of the uterus of animals. These authors used either strips of tissue as in the ordinary muscle preparation, or else observed the organ *in situ*. Helme[10] studied the excised sheep's uterus perfused with Locke's solution and Kurdinowski[16] the uterus of dogs in the same manner. In two instances he observed the entire act of parturition after the uterus had been removed. Cushny[2] found that the pregnant uterus and usually one that had been pregnant, underwent regular rhythmic contractions. The virgin uterus, however, when the abdomen was opened under warm saline, showed no movements. When the virgin uterus was exposed to air or handled roughly, it also showed contractions. Recently Keye[15] and Blair[1] have shown that in the domestic pig and in

the rat there are two types of spontaneous contractions of the nonpregnant uterus, large and small. Keye[15] states that "during the time the graafian follicles are maturing and for a short time after they burst, contractions of the major type predominate. When the corpora lutea reach maturity and up to a time shortly before they retrogress, the minor contractions predominate or are present alone."

Franz,[6] Gunn,[7] and Flury[5] have studied the contractions of strips of human uterus, both pregnant and nonpregnant. Schatz,[20] Polaillon,[18] Hensen,[11] Haskell[9] and Rucker[19] have published tracings of contractions of the pregnant human uterus. I can find no record of any

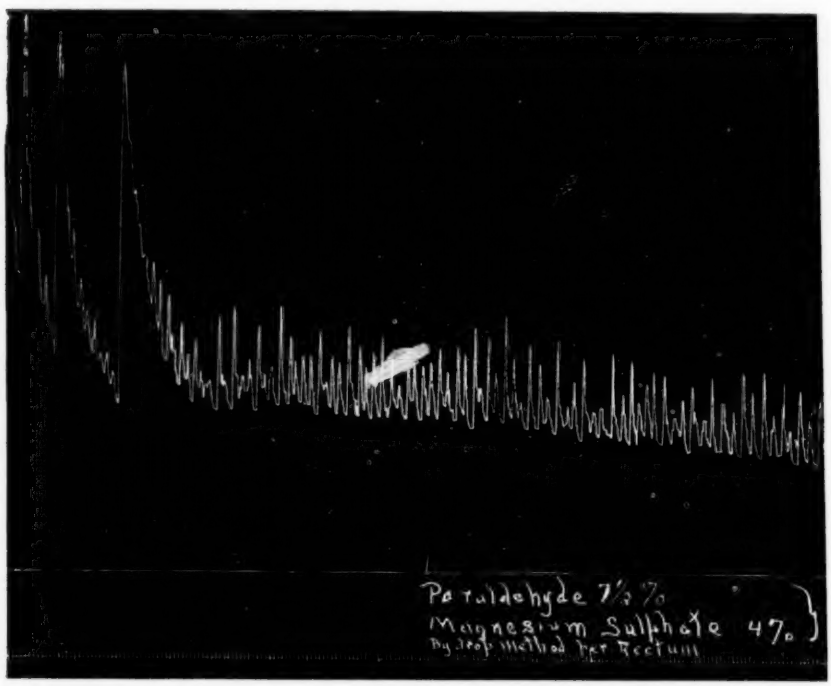

Chart 1.

observations upon the contractions of the nonpregnant human uterus *in situ*.

The accompanying hysterogram was obtained from a patient who was sent into the hospital with a diagnosis of inevitable abortion. She had missed four periods and had been bleeding for a week. Her doctor packed her with gauze two days before she entered the hospital and again the day before she came in. When she entered the hospital a blood stained strip of gauze was removed from the vagina. The external os was open, but the internal os was firm and only slightly dilated. Under the impression that the patient was pregnant, I dilated the internal os with a Goodell's dilator and introduced a No. 2 Voorhees bag. I was unable to get the bag completely

within the uterus. It was partially filled with water under a pressure of 250 mm. of Hg. and connected with a kymograph. The bag adjusted itself so that the pressure fell to 106 mm. of Hg. Without disconnecting the bag from the manometer, I forced enough lysol solution into the system to raise the pressure to 256 mm. of Hg., but the pressure soon fell to 100 mm. of Hg. This was again repeated with the same result. Each time when the pressure fell to about 140 mm. of Hg. the writing point began to show uterine contractions. The contractions varied in force from 18 to 36 mm. of Hg. and occurred comparatively regularly at four minute intervals. The duration averaged two minutes. The relaxation was much slower than in a pregnant uterus and occurred in a jerky manner strongly suggesting the smaller contractions that Keye described in the nonpregnant pig. Unfortunately I was unaware of the true state of the uterus at the time and the drum was running much too slowly to show these minor contractions well. During the time the record was being made the patient was uncomfortable, but had nothing that could be construed as a true labor pain. She was given half ounce of paraldehyde by bowel which put her to sleep but which had no effect upon the uterine contractions.

When the bag came out there was enough dilatation to permit my exploring the uterine cavity with my finger. The cavity was smooth and only a little enlarged. It was curetted and the curettings showed microscopically very little endometrium. The glands were straight and were lined by low columnal ciliated epithelium, and the stroma was dense and compact.

It would seem therefore that the nonpregnant multiparous human uterus *in situ* is capable of rhythmic contractions under certain conditions. The contractions are comparable in both force and frequency to those that occur in the first stage of labor. They however, certainly in this case, differed in that the relaxation was slower and was accompanied by secondary waves. What part the gauze packing played in making the uterus more irritable is of course problematical.

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Medical Arts Building.

A CASE OF PREGNANCY WITH HYMEN INTACT

By Nicholas Schilling, M.D., New Hampton, Iowa

FELIX GAL of Budapest, (Klinik v. Toth), reports a case of "Empfängniss bei kaum wahrnehmbarer Hymenöffnung."[1] In the same volume, page 1262, Dr. Hans Brossmann, Jägerndorf, comments on Gal's publication and adds an observation on "Sectio caesarea bei Atresia Vaginae Congenita." In this connection the followning report may be of interest:

On September 11, 1920, I had occasion to examine Mrs. T. C. O. Her general appearance did not indicate a very serious illness. She was a rather frail, blonde, intelligent American school teacher, twenty-five years of age. She had been married a month and her last menstruation had occurred August 1, six weeks before.

The menses began at seventeen. They had been regular, practically without pain, somewhat scanty in amount but rather protracted in duration. She gave a history of having had several attacks of bronchitis associated with pleurisy. The present illness had begun suddenly, a week before with nausea and vomiting of bilious material. These symptoms were quite persistent and they were aggravated by the smell of food. The patient complained also of headache, extreme weakness and some general abdominal pain. The bowels were regular. There was no bladder irritation or pain in the breasts.

The husband contended that pregnancy was out of the question because sexual intercourse had not been possible on account of obstruction at the entrance of the vagina. No bimanual examination was made at this time. Under general hygienic and dietetic treatment the patient improved.

The vaginal orifice was entirely occluded by an intact hymen. Near the middle two minute openings were finally discovered. Neither one would admit an ordinary surgical probe.

On October 14, under light ether anesthesia the occluding curtain was excised. Throughout its whole extent it was extremely thin and not very vascular.

The uterus was in normal position and in shape and size corresponded to that of a pregnancy of about two months. The cervix exhibited the characteristic softening.

On May 4, 1921, a full term female child was delivered, weighing 7½ pounds. It thrived at once.

Pregnancy associated with an unruptured hymen is a combination decidedly rare. In this instance it is not only surprising that conception occurred, but it is even more remarkable that it supervened so promptly after marriage.

Moreover, the case serves to emphasize the importance of conservatism in formulating medicolegal opinions in matters of this kind.

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[1]Zentralbl. f. Gynäk., 1924, xlviii, 338.

TORSION OF THE PEDICLE OF OVARIAN CYSTS

By Frank Helvestine, Jr., M.D., Charlottesville, Va.

(From the Department of Surgery and Gynecology, University of Virginia Medical School)

INTRODUCTION

TORSION of the pedicle is the most common complication arising in cases of ovarian cysts. Olshausen in 1886, was the first to recognize this condition as a pathologic and clinical entity. A number of theories have been advanced as to the etiology of the condition, but so far none appear applicable to all or to the majority of cases. Most ovarian tumors are freely movable and attached to a fixed base by a pedicle; thus the mechanical conditions favor torsion. Small cysts with long pedicles are more likely to become twisted than the large relatively immovable tumors.

Recently our attention has been directed to this condition by the admission, within a few days of each other, of three cases of ovarian cysts, with twisted pedicles, to the University of Virginia Hospital. Looking back over the records, our series of eighteen cases, although small, appears to be worthy of an analysis to bring out points of diagnosis and symptomatology of this condition. Several of the cases are unusual and of enough interest to justify reporting.

REPORT OF CASES

Case 1.—*A right ovarian cyst with a twisted pedicle, in a girl ten years of age, diagnosed as appendicitis.*

The patient, a white girl, ten years of age was admitted June 14, 1914, complaining of pain in the right lower abdomen. In March, 1914, she had her first attack of pain in this region, accompanied by nausea and vomiting. Subsequently she has had three similar attacks, each of increasing severity. Pain became so severe that she was finally brought to the Hospital. Temperature 100.2° F., leucocytes were 14,600, and the urine negative. There was marked tenderness and muscle spasm in the right lower quadrant of the abdomen, most pronounced in the appendix region. There was no distention and no palpable masses. A diagnosis of acute appendicitis was made and immediate operation undertaken. Upon opening the abdomen a moderate amount of bloody fluid was found. The right ovary was cystic and about the size of an orange. Its pedicle was twisted twice. The cyst was bluish black in color and appeared to be undergoing gangrene. It was removed along with the right tube.

Case 2.—*A cyst of the left ovary with a twisted pedicle causing symptoms simulating renal colic.*

The patient, a white married woman, thirty-three years of age, was admitted October 23, 1916, complaining of "kidney trouble." She had had four children and one miscarriage. There had been no menstrual disturbances. About six years prior to admission the patient suffered with an attack of severe pain in the region of the left kidney, which radiated around to the abdomen, down the course of the ureter to the groin and thigh. With this attack she had a chill, followed

by sweating, and was nauseated and vomited. There were no urinary symptoms. Since this time she has had a number of similar attacks, each accompanied by nausea and vomiting, but with no urinary symptoms. Pain was severe and required morphia. The attacks lasted from a few hours to several days. The present attack began about four days before admission with the symptoms mentioned above. There was some pain on voiding but no frequency of urination. Temperature on admission was normal. Catheterized urine specimen negative. Abdomen was negative. The left kidney could not be palpated and there was no tenderness in this region. Pelvic examination revealed a mass the size of a grape fruit, which appeared to be attached to the uterus and was thought to be a fibromyoma. Cystoscopic examination was negative. An exploratory laparotomy was advised. At operation a small amount of free fluid was found in the abdominal cavity. A cyst of the left ovary, about 12 cm. in diameter, its walls dark red, and its pedicle twisted three times was removed along with the left tube, the fimbriated extremity of which was plastered to the cyst. Palpation of the left kidney and ureter showed nothing abnormal.

CASE 3.—*A solid infected tumor of the right ovary with a twisted pedicle; localized peritonitis; infection caused by the typhoid bacillus.*

The patient, a white woman, twenty-six years of age, admitted August 23, 1921, complained of severe pain in the right lower abdomen. She had two children, the youngest was six months old. She had not menstruated since the birth of her last child. The patient had had some pain in the right lower abdomen for about a week, but severe pain did not begin until about fifteen hours prior to admission. This attack was accompanied by nausea and vomiting. Rectal temperature was 102.5° F., leucocytes 18,000, and the urine showed a large trace of albumin and a few hyaline and granular casts. The abdomen was markedly tender, rigid and a muscle spasm in the right lower quadrant extended beyond the midline. Pelvic examination was negative except for tenderness in both lateral fornices, most marked on the right. At operation there was an escape of a small amount of cloudy fluid on opening the peritoneum. The omentum, loops of small bowel and part of the transverse colon were found to be adherent to a mass in the pelvis. When the adherent viscera were freed a necrotic tumor of the right ovary with its pedicle twisted and surrounded by free purulent fluid was discovered. This tumor was thought to be a teratoma. Cultures from the peritoneal cavity showed B. typhosus in pure culture. The Widal reaction was positive. Examinations of the urine and stool were negative for the organism.

SUMMARY OF CASES

In our series of eighteen cases the ages of the patients ranged between ten and sixty-four. Six or 33⅓ per cent were younger than twenty years; three or 16 2/3 per cent of the cases, were between 20 and 30; six, or 33⅓ per cent were between 30 and 40; and the remaining three or 16⅔ per cent were 45, 50 and 64 years of age respectively. Eleven, or 61.2 per cent were multiparae and seven, or 38.8 per cent nulliparae. Four, or 22.2 per cent of the cases operated upon were complicated by pregnancy of from one to four month's duration. In one case attacks started during pregnancy two months prior to delivery, and in another case the attacks started three days after delivery.

In thirteen, or 72.2 per cent, torsion occurred on the right side. Thirteen, or 72.2 per cent of the cysts were of the serous or pseudo-

mucinous type. Two, or 11.1 per cent of the tumors were not true ovarian cysts but arose from Kobelt's tubules of the fimbriated extremity of the oviducts. Of the remaining three cases, or 16.7 per cent, two were dermoid cysts and the other was a solid teratoma. The majority of the tumors were small or moderate in size, but several were quite large and reached almost to the costal margins.

The degree of torsion varied from one to four complete turns of the pedicle. All stages of degeneration of the tumors were found, from intense congestion, which was relieved when the torsion was reduced, to complete gangrene. Hemorrhage had taken place into the cystic cavities of some of the tumors. Free fluid was found in the peritoneal cavity in seven, or 38.8 per cent of the cases. This fluid was in most instances blood-tinged; in the case in which the cyst was infected the fluid was purulent. In seven, or 38.8 per cent of the cases, adhesions had formed between the cyst and other abdominal structures. Adhesions were very extensive in several of the cases involving omentum, small and large bowel. In one case the adherent appendix showed signs of a subacute inflammation.

Pain was the most constant symptom. It was present in all cases and varied in degree and character. In some, pain was so severe as to require opiates, while in others it was of a low grade. Some of the patients described their pain as sharp and lancinating, some as dull, some as dragging in nature and some as bearing-down in character. Pain started in the lower abdomen in fifteen or 83.8 per cent of the cases. It usually started in either the right or left lower quadrant, depending upon the location of the tumor, and in the majority of cases remained localized; but in some, pain became general across the lower abdomen or all over the abdomen. In three cases pain started either in the lumbar or kidney regions and radiated to the front of the abdomen. In three cases pain radiated down one or both legs. Nausea and vomiting was the most frequent symptom encountered next to pain, occurring in fifteen, or 83.3 per cent. Urinary disturbances principally dysuria and frequency were present in four, or 11 per cent. Five of the patients complained of constipation and one of painful defecation. The attacks were associated with amenorrhea in two patients.

Some distention of the lower abdomen was noted in fifteen cases. Of course in the cases in which the cyst was very large distension was correspondingly great. Tenderness, usually localized, was found in all patients. In six, or 33.3 per cent of the cases tenderness was accompanied by muscle spasm and rigidity. A mass was palpable on both abdominal and pelvic examination in sixteen, or 88.8 per cent. Only four patients had noticed a mass in the abdomen prior to admission. The temperature in the cases without infection varied from normal to 101.5° F; leucocytes from 8,000 to 20,400. The temperature was above

100° F. and the leucocytes above 10,000 in 64 per cent of the cases. Examination of the urine for the most part showed nothing abnormal, in a few of the older patients there were signs of a chronic nephritis, but no case showed evidences of an acute nephritis. Fourteen, or 78 per cent of the patients gave a history of previous attacks.

In this series a correct diagnosis was made in five instances: two cases were diagnosed as appendicitis, and three as appendix abscess. One case was believed to be a tuboovarian abscess, while in another the presence of a large fibromyoma of the uterus was recognized, but the complication of an ovarian cyst with a twisted pedicle was not suspected. No definite diagnosis was made in six cases.

All of the patients in this series were operated upon. There were no deaths and the postoperative course in the majority was uneventful. Pregnancy, where it was found as a complication, was in no instance interrupted.

From the analysis of our series of cases the clinical picture of a typical attack of torsion would be somewhat as follows: The patient, usually a multipara, is seized with severe pain, of a variable character, in the right or left ovarian regions, according to the side from which the tumor originates. Pain is followed shortly by nausea and vomiting. There is a history of previous attacks. The patient appears to be ill and in considerable pain. On examination, the lower abdomen is distended and at the site of the pain there is a tenderness and rigidity on palpation. A mass can be outlined which extends into the pelvis. This mass is tender and semifluctuant. On pelvic examination the mass can be distinguished from the body of the uterus and palpated in one of the lateral fornices. Temperature 100° F. and leucocytes 10,000. Examination of the urine is negative.

The treatment of these cases is by immediate operation, although the patient will usually recover from the attack without interference. However, attacks recur and very serious complications may take place. The prognosis in these cases treated by operation is good even though a complicating pregnancy be present.

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Society Transactions

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SEVENTH ANNUAL MEETING,

CLEVELAND, OHIO, SEPTEMBER 18-20, 1924

DR. GEO. CLARK MOSHER, of Kansas City, as Chairman, presented his **Report of the Committee on Maternal Welfare.** (For original article, see page 269.)

DR. A. J. SKEEL, of Cleveland, Ohio, read a paper entitled **Recent Advances in Our Knowledge of Obstetrics and Their Bearing on Obstetrics as a Specialty.** (For original paper see page 239.)

DISCUSSION

DR. GEO. CLARK MOSHER, KANSAS CITY, MISSOURI.—Dr. Skeel's paper covers in a very graphic manner the progress which has been made manifest in a number of lines of obstetric technic. Those of us whose memory runs back to the last part of the nineteenth century can well recall the frequency with which we came into contact with referred cases of vesicovaginal fistula. Nowadays, as Skeel says, this misfortune is a very rare occurrence indeed. Third degree lacerations still demonstrate that accurate measurements are difficult to make, and the accommodation of passenger to passage is fraught with maternal risk, but these are not so frequent as they were in the past. It would seem that the faulty application of forceps to the unrotated head in a posterior position is one of the gravest offences of the general practitioner of today. As Skeel suggests, the failure to make a diagnosis is more often due to indifference than to ignorance, and we must agree that this counts for much obstetric tragedy.

We also agree with De Normandie and Lynch when they say that we live in an age of hurry and hustle. Nobody has time to wait. Nature is too slow in her method of rotation, so on go the forceps with no regard for position or degree of dilatation. Truly, as Rudolph Holmes says, obstetrics is becoming a lost art, and mainly because of our impatience.

Now, as to the remedy, Skeel is in harmony with all the authorities quoted in our annual report on maternal welfare. Obstetrics is a surgical specialty. In a great many instances our maternity patients are far from being in a condition of physiologic health. The physician must be in every way competent to handle these cases which are surgical emergencies. Even more than this, he must have an obstetric conscience so that he may restrain himself from interference when this attitude is indicated. We must educate the family doctor to become a better obstetric diagnostician.

As to Skeel's proposed innovation of a twenty-four hour service divided into reliefs, each man taking the work coming up while he is on duty, thus conserving

his strength by limiting the hours in the hospital, one must be struck by the idea which would enable the family of moderate means to secure high class attention. It is hoped that Skeel may be able next year, during which period the system is to be installed, to report as to the practical result of the adventure.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—We all agree that obstetrics is a surgical procedure. We also realize that an obstetric procedure is always performed under conditions so absolutely inferior to the splendid surroundings of the organized surgical operation that it is astonishing that the obstetric specialist succeeds even in the well-arranged maternity hospital. When you consider, then, that the majority of such obstetric procedures have to be performed in the house by comparatively untrained men, you can readily understand how much improvement is necessary in obstetrics.

Again, when you realize that the man who would hesitate to perform an appendectomy has no hesitancy whatever to perform any of the obstetric operations except perhaps cesarean section, then you can readily understand that such an attitude must result in a great mortality. The remedy for better obstetrics is, of course, that all of these operations be performed in good maternity hospitals, and that even if the maternity specialist is called in a private house to perform a delivery upon a complicated case, he would find it wisest under those circumstances to have the patient transferred to a hospital where better conditions prevail.

The idea of having a corps of physicians who relieve one another in obstetric cases, is to be desired, and if that can be accomplished it will result in much better work being done by groups of physicians than can be done by a single obstetrician at the present time.

DR. JAMES A. HARRAR, New York, read a paper on **Institutional Antepartum Methods Applied to Private Practice.** (For original article see page 243.)

DISCUSSION

DR. FOSTER S. KELLOGG, BOSTON, MASS.—I happen to be in charge of ten or twelve clinics to which there are 14,000 to 15,000 visits a year. The bulk of them are prenatal visits, and in addition we have a postnatal clinic, one cardiac clinic, and one toxemia clinic, which is a development of the prenatal clinic. I want to endorse everything Harrar has said, which has been found true in our experience.

PROFESSOR O. FRANKL, VIENNA, AUSTRIA.—In regard to what you say about syphilis, I would like to relate our experience of many years in Vienna. First, I made a systematic examination of pregnant women and gave them the Wassermann test. I found very many cases of latent syphilis where it would not have been suspected for there were no symptoms. During the past ten or twelve years during which period we have conducted these examinations, we noticed that positive reaction is reliable, but the negative is not. We sometimes see absolute negative reaction, and yet we discover latent syphilis. Indeed, there has been great progress made in this respect during the last years, and we affirm that we should always combine the Wassermann test with the Meinecke reaction.

DR. HARRAR, (closing).—We find that the hospital public, as we see it, is much better educated than the lay public in all matters of obstetrics. In addition to the antepartum clinic I have mentioned, we also run a cardiac clinic where from fifteen to twenty patients are seen twice a month. We also have a class for postpartum women. This class is held daily under the supervision of a nurse for ninth

day women who are going to be discharged. Instructions are given on the care and bathing of the breasts, explaining why they should be kept clean; time of return to marital relations; dressing and washing the baby. These women are woefully ignorant on these subjects, and are very much interested in everything we have to tell them.

At one of these classes the other day a woman sat crying during the entire period of instruction by the nurse, a half hour. It was feared for the moment that she had had a stillbirth and unfortunately had been sent down to this clinic by mistake to learn how to care for her baby. After it was over she was asked what the trouble was, and she said, "Nicht verstehen." The reason she was crying was because she had not understood any of the instructions spoken in English and she wanted so much to know. We can never be too careful in giving obstetric patients instruction in all hygienic details both before and after labor.

DR. FOSTER S. KELLOGG, Boston, Mass., read a paper entitled, **Further Studies of Recurrent Toxemias in Pregnancy.** (For original article see page 197.)

DISCUSSION

DR. JAMES A. HARRAR, NEW YORK CITY.—Kellogg helps to answer that question frequently put to us when a woman has toxemia and eclampsia, "Will she have it with the next pregnancy?" The compiling of case records will gradually help us decide on the individual case.

I desire to briefly mention two cases; a house surgeon at the Lying-In Hospital some years ago informed me that at his birth his mother had eclampsia, and she was not expected to live. She afterwards had five children without any recurrence of eclampsia. Another case indicates the opposite swing of the pendulum. A doctor's wife had convulsions. I delivered her and she recovered, also her baby. She became pregnant again in about four years, and with all the care we could give her, by the fourth month her blood pressure had reached 180, she had blood in her urine, and we had to induce labor. It is very hard to decide the question we have put to us, but by getting these cases recorded we will gradually lead up to prognosis on the individual case.

DR. KELLOGG (closing).—We carry out blood chemistry, liver tests and kidney tests, and have continued them for about twenty months in all these cases; there are some eighty; and we thought we had something in the liver test last year. But the last seven months have shown disappointment. There isn't one absolute thing in blood chemistry as far as we can say, or in the kidney or in the liver tests. This work is purely clinical, but what we have been trying to do is the scientific work back of it simply to see if we can get something that will help us with these individual cases, and also get enough histories and enough cases grouped under the certain diagnosis headings to see if the preliminary observations are actually true.

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF NOVEMBER 11, 1924

THE PRESIDENT, DR. REGINALD M. RAWLS IN THE CHAIR

DR. HENRY C. COE presented a case report showing the **Importance of Care of the Mouth before Operation.**

Sister B. was operated upon July 22, 1924, by Dr. H. C. Chase at the Woman's Hospital for chronic appendicitis. The pelvic organs were found entirely normal. The wound healed by primary union. On the second day after operation the temperature rose to 101° F., and on the third day to 103° F., and the right parotid gland became swollen and painful. Pain was also referred to the ear and was severe enough to require morphine. The swelling of the face continued until the patient could not fully open her mouth and had to be given fluids through a tube. No fluctuation could be detected, but on July 29 a sudden gush of thick, yellow pus came from the ear, a culture from which showed Staphylococcus aureus. Two days later distinct fluctuation was present and an incision in front of the ear released over an ounce of thick, yellow pus. Examination of the ear showed an opening in the middle of the external auditory canal but there was no mastoid involvement and the drum was normal. Two days later the left parotid began to swell and a blood count showed over 38000 leucocytes with 96 per cent polys. Patient's general condition was rather poor. On August 4 the swelling on the left side was incised but no pus found. The right side required further incision to secure drainage. Final convalescence was slow and the patient was not discharged until September 8th, being at that time unable to separate her jaws more than an inch.

This patient had had the usual care of the mouth before operation and it would seem from the lesson of this case that an even more careful examination should be made of abnormal conditions and treated in advance of contemplated operation. It is also important that the anesthetist, as well as the nurse present during the recovery from the anesthetic, should not introduce infection into the mouth. Moreover, a mouth wash should be used as a routine during the first week after operation.

DR. H. S. MCCANDLISH presented (by invitation) a **Report of 224 Cases of Impetigo in the Newborn.** (For original article see page 228.)

DISCUSSION

DR. HAROLD BAILEY.—It seemed to us that the striking thing about the epidemic was the fact that it did not effect the general health of the individual, except in those cases where there were large areas of exfoliation. The progress of the disease was in the form of an acute exfoliation, such as Ritter described, in which areas as big as the palm of the hand peel off the face and neck, down to small discrete vesicles. We have come to the conclusion, from clinical observation, that exfoliative dermatitis and contagious impetigo are the same disease.

DR. O. PAUL HUMPSTONE.—We have had two or three epidemics in the Methodist-Episcopal Hospital of Brooklyn when our quarters there were more or less cramped. As a result of our experience with these epidemics we learned various practical things.

We employ in the observation of our babies, in the first place, the normal

nursery, and, in the second place, an observation nursery, and beyond that the isolation nursery. Any baby that develops the slightest irritation of the skin goes into the observation nursery. If this spot takes on a red base with a little bleb, the baby goes into isolation, no matter how small this may be. By that means and the sterilizing of the clothes of all the babies, we have now succeeded in the period of about a year in not having any impetigo in the hospital, except a spontaneous case now and then.

DR. FRANKLIN A. DORMAN.—A year or so ago there was a moderate, rather persistent epidemic of this infection at the Woman's Hospital. It was interesting to note that it started with a virulent case of the exfoliative type, which resulted fatally. This was followed by a series of these cases which seemed to decrease in virulence as time went on. However, one case developed a cellulitis. I think it is rather surprising that McCandlish did not see something of that sort in such a large series of cases. That is one of the dangers of this disease and may be fatal.

In the local treatment that we follow, we make no attempt to preserve the integrity of the bleb. As soon as we see blebs we clear out the fluid and apply picric acid. That seems to expedite the recovery and diminish the spread of other papules on the body.

DR. RALPH M. BEACH.—I have had an opportunity in Brooklyn to watch the evolution of the obstetric nursery in four or five different hospitals, in all of which we have had these different epidemics of impetigo. The one thing that seemed to impress me more than anything else in the prevention of the disease and the spreading of it to other infants, has been the use of the slab bath. The hospitals which did away with the tub for bathing babies got rid of their epidemics of impetigo first.

I want to make a plea for the use of mercurochrome in the treatment of these babies. Two per cent mercurochrome used as soon as the red spot appears, will prevent further developments, or if a bleb should appear, paint it with 2 per cent mercurochrome.

DR. W. C. JOHNSON presented (by invitation) **A Study of Pneumonia in the Stillborn and Newborn.** (For original article see page 151.)

DISCUSSION

DR. W. E. STUDDIFORD.—I think there are two or three factors of great practical importance. There is no doubt that many children have been lost by too vigorous attempts at resuscitation. With prolonged labor there is a possibility of amniotic fluid deep in the lung. If the child, when born, is held by the feet and allowed to drip and make its own efforts at resuscitation, the chances are that some of these pneumonias will be prevented.

The next question is of infection in the amniotic cavity, and the possibility of infection of the membrane, starting from the cervix, being responsible at times for premature rupture. Therefore, the handling of these cases with premature rupture of the membrane becomes more and more serious in the interest of the child. It is a question whether active interference is the best thing or whether we should go on in a passive way; but there is no doubt that the longer the membranes are ruptured the greater the chance of getting these pneumonias.

Department of Maternal Welfare

ANNOUNCEMENT

Under the above title we desire to introduce to the readers of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY a new department.

In several branches of modern medical practice there have been developed interests which are not technical, or broadly speaking, perhaps are not clinical and yet are of paramount importance to our profession and to the public at large. The latter in fact has taken a deep concern in such matters and as a result many lay organizations have been developed in recent years for the discussion and possible amelioration of problems that, while perhaps essentially medical, have a broader interest. One might thus refer to tuberculosis, cardiac disease, cancer, mental hygiene and other topics in which lay propaganda and participation sometimes outweigh and even displace a purely medical participation. Within recent years the specialty represented by this journal has been drawn into this field of lay activity and even the national government has attempted through the ministrations of the Shepard-Towner act to control or supervise the problem of so-called "better maternity care." That maternal morbidity and mortality from childbearing is undoubtedly high in this country, cannot be entirely denied, likewise that there is a deplorable loss of fetal life from abortions, premature labors and the accidents associated with childbirth. The correction of these problems must be approached from more than one angle. It cannot be solved except by a combination of forces, and the direction of these forces should rest in the medical profession itself,—which means better teaching of obstetrics, the continued attention of the practitioner to obstetric progress, the inclusion of more obstetric topics in the programs of our general medical societies and the education of the public to demand and to be willing to pay for better attention during pregnancy and labor. In all of this the medical man should be the guiding force and spirit, although lay participation is greatly to be desired and hoped for. One of the most significant developments in recent years is the recognition by our national societies devoted to obstetrics and infant welfare, of the importance of this matter by the appointment a few years ago of a joint committee to study ways and means of meeting the situation and to take steps if possible to improve the same in certain of its aspects and phases. This joint committee now consists of Drs. F. L. Adair, Minneapolis, Minn., Geo. C. Mosher, Kansas City, Mo., Henry Schwartz, St.

Louis, Mo., Ralph W. Lobenstine, New York, N. Y., Dr. Robert L. DeNormandie, Boston, Mass., and Geo. W. Kosmak, New York, N Y., representing the American Gynecological Society, the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, and the American Child Health Association. This committee has developed a tentative program which has already been published on a previous occasion. (See this Journal, vol. v, p. 664, and vol. vii, p. 601.)

Believing that this important work will be forwarded by such publicity as may be secured through the pages of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, the necessary number of pages will be allotted each month to the activities of the "Joint Committee on Maternal Welfare" referred to above, and topics of allied interest.

We take pleasure in presenting therefore the report of Dr. George C. Mosher of this Committee, made at the last meeting of the American Association of Obstetricians and Gynecologists.

GEO. W. KOSMAK, M.D.
HUGO EHRENFEST, M.D.

REPORT OF THE COMMITTEE ON MATERNAL WELFARE OF THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS, CLEVELAND MEETING, SEPTEMBER, 1924

DR. GEORGE CLARK MOSHER, KANSAS CITY, MO., CHAIRMAN

The report of the Committee on Maternal Welfare for 1923 presented a comprehensive view of the conditions demanding cooperation in the work for better obstetrics, and suggested the plans proposed to help remedy a situation made manifest by the investigations of the committee.

At the Philadelphia meeting the enthusiastic reception accorded the report was most gratifying and surprising. Occasion is here taken to express to the Association the thanks of the committee for the appreciation of the importance of its function and the very generous proffer on the part of our Association of assistance for 1924.

Doubtless, growing out of the publicity given the reports of our meeting in Philadelphia, a widespread correspondence developed with lay organizations and individuals requesting information, verification of statements and reprints. These included such organizations as the Chicago Infant Welfare Society, which gave us a quarter page notice in their bulletin; the League of Women Voters, who requested a series of lectures on the subject among physicians in Illinois; the Mother's Day Organization, in Philadelphia, and other women's national associations. Mention is made of this lay interest in the report for two reasons: first, to show the concern of the laity in maternal welfare; second, to suggest the necessity for cautious deliberation on giving out statements to the public by the profession which are apt to be misunderstood.

It indicates, moreover, that the people must be taken into our confidence and taught what constitutes good obstetric care and not merely to be frightened with

alarming stories of suffering and death associated with childbearing. These educational facts are necessary to influence women to put themselves under the care of competent medical advisers early in their pregnancy, rather than to accept neighborly advice and have no supervision until labor is at hand.

The activities of the committee for 1924 have been centered in propaganda to stimulate a demand for better obstetrics on the part of the profession, appealing especially to those whose cooperation cannot fail to be of great importance. Such propaganda was undertaken by our own committee and in conjunction with the very capable committees of the American Gynecological Society, under the chairmanship of Fred L. Adair, of Minneapolis, and that of the American Child Health Association, in July.

A letter was formulated and sent out by the joint committee to the secretaries of all state medical societies as given in the directory of the American Medical Association. This made first an appeal for cooperation in stressing the value of more papers on obstetric topics on the programs of their annual meetings, and more discussion of problems of obstetric importance; and second, asked that each state secretary take up with the secretary of every constituent county society in his state a similar plan of increasing interest in maternal welfare. We hope to follow up these letters of state secretaries to the county societies with an additional communication from the joint committee, and are now receiving the list of county secretaries and writing them.

This method of propaganda, the joint committee hopes will be the opening wedge in breaking the vast mass of indifference which evidently is at the root of our present inert condition. Indifference is a greater obstruction to progress than ignorance.

In addition to this concrete action, the joint committee is endeavoring by a similar letter to engage the attention of the state boards of health through their directors of maternity and infancy welfare to establish a corps of regional consultants in obstetrics. The activities of this body are suggested by those of the one in Ohio, in which two of our Fellows, Arthur J. Skeel of Cleveland and Sylvester Goodman of Columbus, have done conspicuously good work; and that of New York under the active direction of our Fellows, John Osborn Polak of Brooklyn, George W. Kosmak of New York and James A. Quigley of Rochester.

These consultants aim to cooperate, in the efforts of the director with whom they act, to reach those communities where such aid is desired by the county medical society in holding clinics; to give their services when needed in difficult cases without compensation, if necessary; to address meetings and in every way further the cause in which they are interested. We are informed by Dr. Polak, that with an efficient director of maternity—such as that of New York, Dr. Florence L. McKay—the burden of the work is accomplished with comparatively little effort on the part of the board except moral support.

The committee urges further the value of the maternity centers in cities. According to the statement of the late Herman M. Biggs of the New York State Department of Health the work of the New York Division of Maternity and Infant Welfare has definitely reduced morbidity and mortality to such a remarkable degree that it is predicted that in carrying out its plans the deaths of mothers will be reduced 75 per cent, premature births 25 per cent and the death rate of early infancy 40 per cent.

Prof. Henry Schwarz, a member of the joint committee, has done conspicuous work of the same kind. He says: "I have always felt that the medical schools should furnish the opportunities for the training of doctors, nurses and public health nurses, by conducting a model obstetric center, giving ideal obstetric care to

rich and poor alike, including prenatal care and care for six weeks following delivery.''

''I have been training nurses, doctors and midwives since 1880, and have built up such a center in St. Louis. Of course, such a center, like a model farm, can only act as an incentive to others to do likewise.

''I also hold that the committees should help the states to appreciate the benefits and possibilities of model obstetric centers in the remote and backward districts as object lessons, until the respective communities see the light and cooperate to continue such work at their own expense.'' The work of our own committee has been conducted along the same lines with that of the joint committee.

At the suggestion of our secretary, Dr. Davis, a reprint was made of the 1923 report. Copies of this were sent, as a follow-up to the letter of the joint committee, to the secretaries of the state medical societies, hoping to stress the urgency of the work and furnish a basis of discussion. Copies of the reprint were also sent to the editors of the medical press with a letter requesting that increased space be given to articles and meetings pertaining to obstetric technic. Also, copies were filed in each of the medical libraries of the United States.

The chairman of our committee was invited, in October, by the secretary of the American Medical Editors' Association, to address its meeting in Chicago during the session of the College of Surgeons.

In addition to the Medical Editors' Conference, an invitation was received, during the year, from the Obstetrical Section of the Oklahoma State Medical Association, and the subject of maternal welfare was presented to the largest meeting the section had ever held.

A much appreciated invitation, through the courtesy of Dr. Skeel, was given to address the Obstetrical and Gynecological Section of the Cleveland Academy of Medicine in behalf of our committee. Acceptance from invitations to the Missouri State Medical Society, and to the District Medical Society at Higginsville also gave opportunity to urge prenatal care and aseptic midwifery.

The American Child Health Association, which is to meet October 21, 1924, under supervision of George E. Vincent of the Rockefeller Foundation and of which Hon. Herbert Hoover is president, has invited the chairman to make the address on maternity at a symposium covering welfare work of the year.

Abstracts of the 1923 report and favorable mention have appeared in a number of medical journals during the year.

Our own committee has also continued with the questionnaire which brought such valuable responses for the 1923 report, as to the causes of our high morbidity and mortality and the most potent means of controlling the menace. We acknowledge with deep appreciation the contributions made to us in the many letters we have received. The causes have been summarized to a large extent in De Lee's statements.

''1. Lack of prenatal care.

''2. Lack of aseptic practice and conscience in a large number of physicians.

''3. Too much interference with the normal labor processes by men that do not know how.

''4. Unnecessary cesarean section, especially universally performed cesarean section.

''5. Undue exaltation of the child's life over that of the mother.

''6. The rapid growth of maternity wards in general hospitals, indeed the general mixing of maternity patients with surgical and medical cases has contributed enormously to the spread of puerperal infection.''

7. To this category the committee desires to add the indiscreet and indiscriminate use of pituitrin regardless of indication. To one who has not observed the popularity of this obstetric vice its increase would be not only astonishing but appalling.

In a letter written May 4, 1924, Dr. J. Whitridge Williams says: "In approaching the causes of maternal mortality, they are fourfold. (1) Infection; (2) toxemia; (3) hemorrhage, and (4) dystocia.

"Of course it all means bad obstetrics, though it must be confessed that to show how better obstetrics brings about better results is a difficult task. Particularly is this the case in the large clinics where efficient prenatal work and treatment at time of labor is practiced, but the material is burdened by the large number of patients who are sent into the institutions after trouble has already occurred in the hands of incompetent or ignorant people. Possibly a number of first-rate institutions could unite in developing a set of expurgated statistics, that is, results obtained in so many thousand women who have received prenatal care and trained attention at the time of delivery and then comparing these figures with the gross statistics afforded by the health officers of the various states. This would be a huge task and would require special funds to pay for trained persons to collect the statistics."

Wm. Clark Danforth of Evanston, one of our joint committee, under date of September 5, 1924, thus expresses his views of morbidity and mortality and the means of decreasing them. "If the entire medical profession could be made thoroughly alive to a few fundamental obstetric principles, conditions would be at once materially improved."

1. Our joint committee should succeed through the county medical societies or in other ways, in getting into the minds of all physicians a realization of the essentiality of about four simple procedures in prenatal observation; complete physical examination; pelvimetry routine; analysis of urine and blood pressure. All of these are, in the hands of the vast majority of doctors, either slighted or entirely neglected.

2. We must inculcate some teaching of simple ordinary asepsis. Even in large centers of population many men who know better have got into bad habits and many others have rudimentary ideas of the necessity of asepsis.

3. An intelligent conservatism is to be emphasized to offset the growing fashion of all forms of operative interference. Many of these are going to be practiced by untrained men to the great danger of their patients.

There is only one answer to the question as to the remedy for these causes and that is summarized in the word education. The work of the committee this year as already set forth has been largely concerned with the education of the men already in practice, and has been directed largely toward inculcating the ideas of the imperative need of elementary prenatal care, aseptic attention at the time of delivery and a conscientious postpuerperal attention to the patient until she has entirely recovered.

But this education must start further back and the profession must be taught the nature of obstetrics.

Gradually the understanding that childbirth is no longer a normal function is increasing, although it is not a new theory. We are indebted to DeLee for the privilege of making the following quotations from the advance proofs of the new edition of his textbook in obstetrics.

"We may go back a hundred years and find Mauriceau proclaiming that women only escape being sick once a month by having a sickness which lasts nine months. Sir James T. Simpson said parturition is always physiological in its object, but not in some of its phenomena and peculiarities which attend it in civilized life.

"Engelmann said a simple normal labor is no longer possible.

"Henry Schwarz says that tradition and ignorance are combined in spreading the fable that childbearing is a physiological process.

"John F. Moran in 1915 appealed for a nation-wide propaganda to teach the laity that the long cherished fallacy that pregnancy and labor are physiological conditions should be abandoned.

"J. Whitridge Williams in 1923 said that 50 per cent of all pregnant women show some effect of toxemia which he classifies as pathological, and Sellheim, in 1923, avers that the demands of modern life upon woman are such that she has reached the limit of her power to meet the strain of pregnancy."

Dr. J. E. Cooper of Battle Creek, Michigan, writes the committee, among other suggestive conclusions—"Both patient and physician must be educated to the fact that obstetrics is actually a surgical condition. An education of this sort must be carried out in a semipublic manner."

He refers to the work of the Michigan State Board of Health who send out letters of instructions to women, of whose pregnancy they learn, telling what to expect of their physicians. While Cooper does not find himself quite in harmony with this method of education he feels it has done a great deal of good and that mortality will be reduced by this method. That we must anticipate the methods of the practicing physician in the education of the medical student is indisputable.

The replies to the question as to the weak points in the teaching in our medical schools, left no doubt as to the conviction on the part of many that the presentation of this subject in the curriculum is too limited in its scope and too much subordinated to other branches.

In a most interesting letter Frank W. Lynch, a member of the joint committee and a teacher of recognized ability in the University of California, writes that in his opinion the greatest fault in the teaching of obstetrics today is the lack of sufficient clinical drill in practical delivery and follow-up of patients under first class instructors. Lynch sets seventy-five cases as a maximum of experience which should be demanded before the neophyte is permitted to go into the practice of the art of obstetrics.

In quoting more at length from the valuable observations of Lynch, an interesting viewpoint is presented.—"The chief cause of maternal mortality is that doctors do not like to wait. There exists a desire to substitute surgery for normal processes. The world is in a hurry. For this reason classic indications for interference no longer hold.

"In California, after a day or two of waiting cesarean section is a common occurrence; nor is the death of the child considered a contraindication for a laparotomy!

"This feeling has developed because all too few doctors have had any apprenticeship in obstetrics. They have taught themselves their own system. The ordinary student does not see enough obstetrics to impress proper procedure upon him. Constantly, fifth year students working as internes throughout the country, tell of methods which they were taught to consider dangerous but which they find have been done by others before their day without mortality.

"In consequence they are impressed with this type of a demonstration rather than with all the didactic work in the medical school which they have already forgotten.

"The stabilizing effect of properly conducted maternity hospitals has not been sufficiently emphasized in reports of our committees. I feel that there is much bad obstetrics simply because men teach themselves."

Lynch's conclusions have the same familiar ring as those of Franklin Newell and Edward P. Davis and others whom the Committee quoted in our 1923 report.

"This situation will not improve until obstetrics assumes a more important place in our medical curriculum. No matter what the student thinks he will do after graduation he attends obstetric cases anyhow. His first experience is usually obtained from his own practice, since few see enough cases before graduation to make much impression on them. I feel that pressure should be brought to bear on all medical schools to compel them to give students at least seventy-five cases of labor before graduation. This will at least give the young graduate an opportunity to learn something of normal labor before turning him loose on the community."

A singular coincidence in the critical analysis of the causes of morbidity and mortality is the identical conclusion of Robert L. De Normandie of Harvard Medical School, a member of the joint committee on welfare with that of Lynch of San Francisco, each of them affirming that lack of conscience on the part of those doing the bulk of obstetrics is to blame. "Men do something which they know is wrong and radical and the patient survives. Then such practice is continued until serious results ultimately follow.

"Then, the public at large is not educated up to the importance of good obstetric care. Good care brings the economic factor of better fees and as the average man's services are worth about what he receives in his fee, we all know what that is.

"Present day life is a tremendous hustle. This tends to more operative work than is necessary. It is done by men with absolutely no operative obstetric training. These men who leave our school with thorough theoretical training leave with absolutely no training in operative obstetrics, yet they go out and attempt anything that comes up in practice, hesitating to call consultation, feeling that to the family that would be evidence of weakness which is not to be admitted until too late."

The advantage of hospitalization in obstetrics is more and more being emphasized. Eno claims that there is a maternal morbidity of 8 per cent in house cases and but 2 per cent in those in the hospital. Morbidity of primipara is four times that of multipara. Long labor, frequent vaginal examinations show a marked increase in morbidity, variously estimated at 33 to 75 per cent. As contributing causes the following are to be considered.

1. Interference by intrauterine douche.
2. Delivery by version and extraction.
3. Craniotomy.
4. Manual delivery of placenta.
5. Cesarean section.
6. High forceps and mid forceps.
7. Bag induction.

It is to be borne in mind that house deliveries are said to be four times the risk of hospital cases, and primipara four times the risk of multipara. Consequently, the safeguarding of primipara in particular is enormously increased by hospitalization.

It is felt that we are justified in reinforcing our report by this argument for better obstetrics, since, with a clientele whose situation is handicapped by such appalling risk why should the profession not approach the task of its aid to maternity with not only clean hands but clear heads and with a training which such a high calling demands?

Then, what are the facts? Obstetrics has from the beginning of medical practice been undertaken with an apology. Of the men who do a large part of the practice

of midwifery it is certain we may say it is as a sort of make-shift. It is only done to accommodate their friends who urge them to look after them. Or, it is accepted simply as a stepping-stone to family practice. Internists who are interested in the pathology of pregnancy, ally themselves with young surgeons whose idea of obstetric care is an abdominal section and even today there survives the anachronism of the ignorant midwife. However much maligned, her statistics are not marred by meddlesomeness.

In the magazine *Hygeia* for September, 1924, W. S. Rankin, Chief Health Officer of North Carolina, makes this starting statement: "Seven hundred fifty thousand women are annually delivered in the United States by midwives, especially in the rural districts and among the poor of the mountain regions of the South; one-third of the two and a half million mothers of this country. They are a necessity since there are not enough doctors living in these sparsely settled communities to care for these maternity cases." A million and a half more women are without prenatal care, Rankin claims, and to this fact he attributes a great share of the morbidity and mortality of childbirth. He pleads again for education of doctors, nurses, midwives, and prospective mothers, but asserts the midwife has a hold on ignorant people which has become a state of mind and cannot be changed in a generation.

The committee wishes to call special attention to an intensive survey which has been undertaken during the last ten years in Mansfield, Richland County, Ohio. This demonstration has been the means of working out the elements of a practical plan of fundamental features of health work, including prenatal and obstetric care.

There are included divisions of health, supervision of babies and pre-school children and school health.

A remarkable impression has been made on the community mind and conscience. The director of the demonstration has been officially recognized by both city and county authorities and is now general health officer. Mansfield physicians and those of the county, of their own accord and in conjunction with the director have formed postgraduate courses in obstetrics and pediatrics.

A thorough plan of health work in the schools is being consummated both by city and county. All nursing work in the city has been consolidated with increased community support of a financial nature. After five national demonstrations held in widely separated regions there are now proceeding combinations of national agencies and local communities more or less after the Mansfield venture.

The practical results of these phases of welfare must help to stimulate similar endeavors in contiguous communities. This is the sort of work that the regional consultants in Ohio and New York have been developing and which this year the State Board of Health of Missouri has also started to organize.

In the *Child Health Magazine* for July, 1924, among other very interesting reports is that of the maternal mortality rate in Minnesota which is now fifty-one per 10,000 live births. While this is a remarkably low rate for the United States, which still holds the record for the highest maternal mortality of any of the principal countries of the world, Minnesota's record of fifty-one is higher than that of fifteen countries. The article concludes with the pertinent thought that always arises in these discussions—since 75 per cent of all these deaths are preventable, such a death rate certainly properly calls forth a horrible criticism of the management of labor.

Rudolph Holmes, in an address before the Association for the Study and Prevention of Infant Mortality, deprecates the movement for continuing any form of midwife assistance as an anachronism. He believes in the prenatal clinic; a maternity hospital covering with various divisions, all the needs of the prospective

mother and her child, both before and after its advent into the world. His ideas of the hospital and home care are identical with those of our maternity center. Primipara are to be delivered at the hospital as well as all pathologic cases. Multipara, with runabout children as an added problem, are to be cared for at home by young enthusiastic practitioners who should receive some stipend for their services and who should call for help on the parent institution as may be required. All such cases should be reported back to the hospital staff, and all records should be discussed in the staff meeting and the personnel of this body should be imbued with the responsibility of its task. It should comprise men with an obstetric conscience.

One of the serious difficulties which the committee has encountered is the lack of uniformity in systems of making reports in various communities. When the operation of the Birth Registration Area becomes universal, this particular defect will be at once remedied. For instance, in some cities stillbirths are not included in the total births, but of course are a part of the mortality. This has been one feature of the high rate under which Kansas City has long suffered. Naturally, the birth rate must be estimated from the total number, if the figures have any value. Then, there is a discrepancy as to what constitutes a stillbirth; as to where the line is to be drawn between a nonreportable abortion and the birth of a stillborn infant. Our future program includes an attempt to rectify this discrepancy.

There is a difference also in computing statistics as to mortality. In some states, the mortality rate is based on the number of deaths among 10,000 live and stillbirths. In other tables the computation is made from the total female population between the ages of fifteen and forty-five.

The committee believes also that the *International List of Titles of Causes of Death* should be used in all calculations so that uniform and accurate conclusions may be reached.

Of course, it is not necessary to say, before this body, that what this committee has in contemplation is in the nature of a popular revolution of ideas. Our program is, therefore, subject to difficulties proportionate to its scope and vision. Many minds must be reached and convinced. Time and persistence are needed to effect these widespread and iconoclastic results. Many of the statements made in this report have been repeated; its arguments duplicated until they sound trite and worn to our ears. But they must be repeated and duplicated oftener and increasingly. In propaganda and education the committee puts its faith. We cannot afford to tire of the subject because it has been discussed before. The work and effort will be justified.

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Massive Excision of Subcutaneous Abdominal Fat—An Analytical Review of the Literature and a Report of Eleven Personal Cases

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THE profession is not sufficiently acquainted with the benefits, cosmetic and physical, that can be secured by the operative removal of large masses of subcutaneous abdominal fat. Fatty pendulous abdominal walls have been looked upon as natural, as irremediable and therefore have received but very little study. It has, however, been repeatedly and amply demonstrated that superfluous masses of subcutaneous abdominal fat can, with safety and with advantage to the patient, be removed by operation.

Fat in excess may be deposited either in the subcutaneous cellular tissue or in the muscular and fascial layers of the abdominal wall, or may be indifferently distributed in all the tissues intervening between the skin and peritoneum. The abdominal wall may contain a layer of fat from three to four and one-half inches thick,[1, 4, 5, 20] even six inches thick.[25] Jolly classifies abdominal fat accumulations as follows:

(a) The pendulous abdomen presenting changes in the muscular and fascial tissues of the abdominal wall.

(b) Subcutaneous fat accumulations not associated with much weakening or impairment of the abdominal wall.

(c) The combination of (a) and (b).

The essential anatomic characteristic of the morbid entity herein discussed is the pathologic accumulation of fat in the subcutaneous cellular tissue of the abdominal wall. In all these cases the abdomen shows a symmetric, at times an enormous[9] increase in volume. The fat excess is present mainly in the lower, anterior and lateral infraumbilical portions of the abdominal wall. This superfluous local fat deposit is usually, though not always, a part of general obesity.[9, 13] "All these patients were enormously fat."[17] "Patient on admission to hospital weighed 464 pounds. When on her feet, the abdomen hung down to her knees."[6] It may or may not coexist with other, related or nonrelated, pathologic changes in the abdominal cavity, contents or walls.

As many cases are reported with but few details, attempts to secure adequate and accurate data meet with difficulties. A diligent search of the English, French and German literature* yielded seventy-seven

*All the publications to be found at the John Crerar Library, Chicago, Ill.

operatively treated cases serviceable for analytical study. To these we have added eleven personal cases. We did not use the cases of Babcock, forty cases,[1] of Lathrop, one hundred and three cases[14] and others that are too briefly reported.

All the patients were adults. In many cases the exact age is not reported. The youngest, at time of operation, was twenty-five years old;[27] the oldest were fifty-six,[21] fifty-seven[18] and fifty-nine years (personal case). In the other cases, the age is stated as follows:

Years	Cases
26 to 35	9
36 to 45	18
46 to 55	22

Excessive localization of fat in the abdominal wall is infrequent in men. In our series, there were six males[7, 14, 23, 27] and two personal cases and eighty-two females. Flabby and sagging abdominal walls overloaded with fat are met commonly in individuals who since early life have been corpulent; the most pronounced forms, however, are seen in multiparae. Thirty-three cases occurring in multiparae, eleven-parae one case,[21] ten-parae one case,[12] etc. It also occurs in nulliparae.[9, 10, 16, 25, 26]

Lack of space does not permit the discussion of the many complicating conditions that aggravate the discomfort and disability provoked by pendulous abdominal walls.

Redundant fatty abdominal walls, if uncomplicated, give few symptoms. These symptoms, however, both subjective and objective, are characteristic and conclusive. All the objective symptoms are demonstrable either to inspection or by palpation. At first, pain and disability are slight; the condition progressing, they and the other associated symptoms increase in severity. "Not much pain at first; the swelling of the abdomen gradually increased as did also the shortness of breath and the great pain in the abdomen, in front as well as in the back."[4]

Pain is influenced by posture and is more marked with the patient in the erect posture. The pain is increased by all forms of exercise. It is lessened and in some cases disappears with rest in the recumbent posture. It often has the nature of a painful, dragging sensation, and is lumbar, inguinal and hypogastric in location. These patients are inactive;[28] they become averse to all effort, there results a vicious circle, for the increased inactivity leads to increase of the local and general adiposity. In women who near the menopause take on adipose, there not uncommonly forms a huge, pendulous roll of fat across the lower abdomen, below the umbilicus. This pendant fat-mass creates a crease, often madid and eczematous, located just above the symphysis pubis.[13] In most patients, the continuous contact and friction of the inferior cutaneous surface of this fat apron and the underlying regions determine an erythema, an eczema, an excoriation, an elephantiasis[9] of the skin of lower abdomen, of the inguinal folds and in some cases of the upper part of the thighs. Some patients present two distinct creases. All the subcutaneous tissues of the hypogastric and iliac regions take part in the formation of these folds

which extend transversely from one lumbo-iliac region to the other and which vary in length and thickness. In the recumbent posture, the flabby, fatty mass gravitates to either side and sags over the iliac spines and crests.[25] The prolapsed tissues show impaired tonicity and resistance. Nearly all the patients are obese: two hundred twenty-seven pounds,[24] two hundred forty pounds,[4] two hundred eighty-five pounds,[13] three hundred fifteen pounds (Gibbon-14), etc.

This excessive fat-deposit hangs apron-like over the external genitalia and the upper portion of the thighs[12] and may overlap the upper two-thirds of the thighs.[28] "In the standing position, the abdomen hung down in a fold which extended to within two inches of the patella."[25] "The abdominal wall reached below the knees when the patient was standing."[14]

Other subjective symptoms and objective signs are enumerated in conjunction with indications for operation.

Pendulous fatty abdomen must be differentiated from diastasis of the recti abdominis, with which it may be associated. If it be suspected that the recti abdominis are abnormally separated, the examination is best conducted with the patient in the recumbent posture. The patient reclining, is told to elevate the head as high as possible without the help of the arms. If the diagnosis be positive, this maneuver separates the inner borders of the two recti muscles from one another, causes a greater or lesser prolapse of the intestines through the gap and enables the examining hand to easily depress the superficial abdominal coverings into the abdominal cavity.

The careful clinician will not overlook or misdiagnose hernias (umbilical, inguinal, ventral, etc.) They frequently coexist with pendulous abdomen. Their anatomic location and clinical characteristics are suggestive. Hernias give an impulse on coughing; often present a volume larger at times than at others; if intestinal, they give a tympanitic note on percussion. If no hernia be present, if there be no abnormal separation of the recti muscles, the fat-mass can be easily raised from, and made to glide somewhat upon the underlying resistant muscular wall.

In properly selected cases, large masses of fat can be removed from flabby, sagging, fatty abdominal walls when the excessive fat deposit—

1. Causes great annoyance and discomfort;
   - (a) Pain.[11, 16]
   - (b) Backache.[24]
   - (c) Dyspnea on moderate exertion—ascending stairs, walking, bending.[27]
   - (d) Distressing irritation,[3] inflammation of the skin, erythema,[7] intertrigo,[22] eczema,[14] chronic inguinal excoriation.[15]
   - (e) Pouch-like overhanging of a cumbersome, useless, fatty apron in front of the upper portion of the thighs.[6, 9, 12]
   - (f) Undue fatigue[21] and painful dragging sensation from the weight of the mass.[19]
2. Determines manifest disability;
   - (a) Interference with locomotion.[27]
   - (b) Interference with marital relations.[7]

(c) Interference with the exercise of one's calling.[9] "Patient said that she was becoming a semiinvalid and insisted that she be relieved."[6]

3. Constitutes a physical handicap;[13]

(a) Inability to comfortably and gracefully assume the erect posture; waddling gait.[13]

(b) Inability to attend to the toilet of the lower part of of the body.[13, 22, 28]

4. Becomes an unbearable social handicap; patient is unwieldy, unsightly, incapacitated for recreation, not sick, not well.[2, 13] "The dragging sensation caused by the pendulous abdomen was so great that she was forced to keep off her feet as much as possible."[6]

Resection of large masses of subcutaneous abdominal fat is also justifiable and most serviceable:

1. In the obese, to lessen the tendency to hernia formation.

2. In operating for hernia in obese individuals, so as to obtain better exposure of hernial rings and hernial regions.

3. As an associated, supplementary and terminal step to many abdominal operations: hysterectomy (Marvel-20); ovariotomy;[9] cholecystotomy and cholecystectomy (personal cases); appendectomy;[24] uterine prolapse and retroflexio uteri.[21] "In association with lipectomy, we have frequently drained or removed the gall bladder, the appendix or have performed other abdominal or pelvic operations."[1]

4. As a preliminary step to many abdominal operations so as to facilitate intraabdominal work:[2] a small fibroid in an atrophic uterus, a retrocecal appendix, a small gall bladder tucked away in a deep fossa with a stone in the cystic duct or still worse a stone in the common duct, etc.

5. In cases in which the careful fitting and wearing of an orthopedic apparatus is not otherwise feasible. "Lipectomy was done to facilitate the fitting and wearing of an orthopedic apparatus for the support of the strained sacroiliac joints."[16]

The benefits secured from massive resection of superfluous subcutaneous abdominal fat are so evident, so manifest, and the dangers attending the operation are so negligible that even in the absence of any other pathologic process calling for an abdominal operation, the surgeon should not hesitate to advise and to urge the excision of these useless, troublesome and cumbersome fat accumulations.

The risks of simple lipectomy, either performed alone or in conjunction with other operative procedures, are far outweighed by its beneficent results. It has been successfully performed at the same sitting with operations for the cure of hernia (umbilical, inguinal, ventral, epigastric, incisional), appendiceal, gall bladder and uterine disease, etc. In the eighty-eight cases furnishing the subject matter of this paper, only two deaths are recorded. One patient, operated upon for umbilical hernia and pendulous abdomen, died from embolism.[29] MacLean's[16] patient, operated on for pendulous abdomen and incisional hernia, died from peritonitis on the fifth postoperative day.

Lathrop[14] operated one hundred and three cases of umbilical hernia. In fifty-seven of these, he removed some excess fat. In the remaining forty-six cases, he performed a regular lipectomy. He reports one death which occurred twenty-two days after operation. The patient,

a man weighing 325 pounds, from whom twenty-two pounds of fat had been removed, did well for two weeks, then his kidneys began to fail and he gradually succumbed.

In twenty-four cases of our series, a simple lipectomy was performed[2, 7, 12, 13, 14, 16, 21, 22, 23, 25, 26, 27] and in five personal cases. In simple lipectomy, the operative procedure is limited to the massive retrenchment of redundant subcutaneous fat and overlying skin. The incisions extend through the skin and fat, down to the fascia and not beyond.

In the remaining sixty-four cases, the lipectomy either preceded or followed, but always at the same sitting, operative steps for the cure of—

(a) an umbilical hernia,[2, 4, 5, 6, 10, 13, 14, 16, 17, 18 21, 28, 29.]
(b) an epigastric hernia ([3] and one personal case);

In (a) and (b), the overlapping of flaps leads to local elevation or ridge formation. This need not disturb the surgeon; the fortifying of the abdominal wall has been accomplished.

(c) a large ovarian cyst and umbilical hernia[9] (two cases and one personal case);
(d) a ventral hernia(Gibbon-14);
(e) an incisional hernia;[15, 24]
(f) uterine disease (uterine fibroid) (Marvel-20);
(g) uterine prolapse;[21]
(h) appendicitis([24] and one personal case);
(i) gall bladder disease, cholecystostomy or cholecystectomy ([2] and one personal case);
(j) diastasis of the recti abdominis.[15]

Lipectomy has also been performed—

(a) to facilitate intraabdominal work, by making intraabdominal organs more accessible;
(b) to assure a better adjustment of orthopedic appliances.[16]

Different operative procedures are employed for the cure of the condition under consideration, each operator being partial to the method which has given him the most satisfactory results. Whatever technic be used, it is all important and it must always be adapted to the case at hand that the integrity of the abdominal muscles, fasciae and properitoneal fat be fully respected. Only the skin and fatty mass immediately subjacent to it and directly in front of the fascia are to be removed.

The operation which we perform and recommend is entirely different from that performed by Creveling and others who, to restore the abdomen to normal size and contour, carry their incisions through the entire thickness of the abdominal wall into the peritoneal cavity. Bear in mind that we are not considering here prolapsus of all the abdominal coverings. We are only discussing the removal of excessive subcutaneous fat accumulations.

In the reported cases the amount of fat removed varies; and here it is well to note that many operators state with emphasis that they could, with much additional benefit to the patient, have removed more fat than they actually did. The completeness of the fat removal is a

measure of the freedom from fat thereafter of the part operated. Enough fat should be removed to completely eliminate soreness from chafing. It has been our practice to remove the mass in one or two pieces. Concerning the quantity of excised fat, different clinicians express themselves as follows: "Several pounds of fat and skin."[4] "From one-half to fourteen pounds."[1] "The mass was so long that as I held one end up high in my hands at breast level, the other end dragged on the floor and it was so heavy that it was difficult to keep my hold."[13] "The specimen removed was one yard and three inches long, one and one-half feet wide, three inches thick at the edge and weighed seventeen pounds."[5] "Removed a wedge of fat weighing thirty-two pounds" (Clark[14]). "The flap of belly-wall fat removed together with the hernial contents weighed forty pounds."[10]

After having performed several lipectomies, the surgeon experiences little difficulty in deciding how much fat it is judicious to remove. The removal of one large wedge-shaped fat-block, occasionally two, rarely three, usually suffices. As the patient lies in the recumbent position, the fatty mass gravitates to the sides and can be picked up, can be lifted up as a great ridge or fold lying across the abdomen. The operator grasping this mass in the center, pulls it up and away from the body and circumscribes it by two incisions, one passing a little above and the other a little below the lines of deflection.

It is preferable that the incisions be clean-cut, made with one or several long sweeps of a broad-blade scalpel or short amputation knife. The length of the incisions has little appreciable influence on the outcome of the operation. "The incisions were twenty-one inches long."[17] "Incision was twenty-seven inches in length; there were four hundred square inches of raw surface."[15] "After being sutured, the incision measured twenty-two inches in length from flank to flank."[4] "When stitches were removed, the abdominal incision had contracted until it measured only twenty-seven inches from side to side."[6] Patterning by slicing is bad practice. Small hacking cuts are to be condemned. The smoother the fat surface, the better the approximation. Two initial incisions usually fulfil all requirements. These two incisions converge into one upon the fascial layer, thus no undermined surfaces, no pouches for the accumulation of wound secretions are left. Sufficient skin must be left for approximation. There must be no undermining of the wound edges.

In the reported cases, dissimilar incisions differing in type, in length, and in location, were employed. Most operators used two transverse elliptical incisions joined at both ends,[5, 6, 10, 14, 16, 17] etc. In some cases, the upper incision was supra-umbilical; in most cases, both incisions were made below the umbilicus. The incisions, starting at either the anterior, or middle or posterior axillary line of one side cross the abdomen and terminate at a corresponding point on the opposite side. Castle[5] began his upper incision two inches lateral to the spinous process of the lumbar vertebra and carried it above the umbilicus, across the abdomen, to an analogous point on the opposite side. The ends of this incision were joined by a second transverse incision crossing the abdominal wall above the pubes. These two incisions outlined an ellipse. Cullen[6] circumscribed a large transverse elliptical area which, after removal, measured thirty-six inches from side to side and nineteen inches from above downward. Shallenberger,[24] by means

of a double infra-umbilical incision going from flank to flank, embraced an elliptoid area of skin 45 cm. long and 15 cm. at its widest part.

In selecting incisions, we are guided as to length, type and location by various factors such as, the existence or absence of complicating conditions, the nature of the other indicated operative steps, the amount of fat to be removed, the patient's general condition, etc. For the excision of large wedge-shaped fat-blocks, we have adopted and recommend two transverse elliptical incisions, beginning well over on one side and extending to corresponding points on the opposite side. These two incisions converge toward the fascial layer. Many other operators follow the same practice. If an abdominal section is to be performed at the same sitting, the fat is first removed by means of a double transverse incision. This having been done, one proceeds to enter the abdominal cavity by a vertical incision through the rest of the abdominal wall. Bullitt[4] completed his operation for umbilical hernia, then prolonged, in both directions and to both flanks, the horizontal incision which he had made. A second transverse incision joining the ends of the first incision was then made; at its midpoint, it was about seven inches below the first.

Transverse incisions have the disadvantage of increasing the already large waist measure and of leaving at each end of the wound an unsightly projection. To avoid these, Babcock[1] removed a small vertical ellipse of skin near each end of the transverse incisions. If transverse incisions be used, the approximation and the apposition of the flaps is effected more easily, the liability to postoperative separation of the wound-edges is minimal, primary union[4, 9, 10, 20, 22, 28] is frequent, delayed healing is rare[16] and long-delayed cicatrization is very uncommon.

Longitudinal incisions found favor with few clinicians. Frist[9] made two longitudinal incisions, 70 cm. in length, outlining an ellipse that extended from about a hand's breadth below the xiphoid cartilage to a hand's breadth above the symphysis. At their point of maximal separation from each other, each of these two incisions was fourteen cm. external to the corresponding mamillary line. The wound edges having separated in a few places, healing was delayed. Spaulding[25] made an elliptical incision on each side of the median line. Each incision extended from just below the breast to the center of Poupart's ligament. He removed the integument and fat six inches thick down to the sheath of the abdominal muscles.

In some cases, we made two elliptical vertical incisions at each end of the transverse incisions and were thereby enabled to remove two additional wedge-shaped fat-blocks. Babcock[1] recommends removal of a vertical ellipse of skin and a vertical line of closure. He alters the shape of the ellipse so as to best contour the waist and upper pelvis. In order to remove a large amount of subcutaneous fat, he widely undercuts the skin. This practice is avoided and condemned by most operators. Schepelmann[21] uses a "lyraform" incision. I have had no experience with it.

Though multiple incisions, patterning by slicing, hacking cuts, undermining of wound-edges, excision of vertical fat-blocks are not conducive to the most esthetic and satisfactory results, they have been practiced by some. For instance, Ballard removed fat and skin from above downward as well as from side to side. To quote his own words: "I removed an elliptiform piece of tissue down to the fascia extending

from within three inches of the symphysis pubis and eight inches at its greatest width. I then removed two large v-shaped strips transversely from about the center of the perpendicular incisions."

Fat is a tissue of low vitality and special care must be taken that there be little or no accumulation of serous or serosanguineous fluid between or beneath the flaps. Retained wound secretions retard healing, invite infection. A drain is inserted at either end of the wound; if the wound be long, a drain may also be inserted at its center. Closure is effected by approximation sutures of silkworm-gut. For the exact apposition of the wound edges, we use linen. In these cases, I frequently advise the application of hot boric acid compresses to the operative wound for from two to three days; these fomentations are to be renewed every four hours. The drains are removed as soon as the discharge warrants it and the patient is kept in bed for about fifteen days. The result of the closure should be a smooth abdomen with a linear scar[7, 13, 27] and without any hanging folds[19]—"the pendulous appearance being entirely removed and replaced by a simple large pronounced ridge."[4] Some patients during the first few postoperative days complain of abdominal tightness, of abdominal constriction.[18] It calls for no special treatment.

PERSONAL CASES

CASE 1.—Female; forty-six years old; 5-para; weight 265 pounds. Complained of dyspnea on exertion, was apathetic and tired easily. There was great disinclination for all forms of exercise. Palpation outlined with difficulty a mass in abdominal cavity; it proved to be a left multilocular ovarian cyst. Operation: Ovariotomy and excision of a wedge-shaped mass of fat and skin weighing thirty pounds. Cyst weighed 9.90 pounds. Patient left hospital at the end of fourth week with wound completely healed. Postoperative treatment: Dietetic. Patient was seen five years later. Shortness of breath had completely disappeared and she was able to do all her own housework.

CASE 2.—Female; fifty-two years old; tertipara; three abortions; menopause at 43 years; weight 240 pounds. In the dorsal position, the pendulous abdomen was on the level with the perineum; in the erect position, it was a couple of inches lower down. There was a very distressing irritation of the skin in the crease made by the transverse abdominal fold. Operation: I excised a mass of fat and skin weighing eighteen pounds. For a few days, fatty serum escaped from both angles of the wound. Patient was seen three years after operation. She expressed great satisfaction as to the cosmetic and physical improvement.

CASE 3.—Female; forty-nine years old; two-para; weight 240 pounds. For last four years, had noticed a small but painful epigastric swelling in the median line. Condition was misdiagnosed and treated for dyspepsia. Since birth of her last child, there had been a gradual increase in size of the abdomen and an increase in body-weight. Patient had a waddling gait and was unable to give lower part of her body the proper care. Patient's condition had unfavorably influenced her home life. Operation: radical cure for hernia and removal of a mass of fat and skin weighing nineteen pounds. Uneventful recovery. She was seen six years after operation. Fatty accumulation and hernia had not recurred.

CASE 4.—Male; forty-four years old; ex-saloonman and office holder; weight 320 pounds. Patient suffered from general obesity and was much handicapped by his physical infirmity. He was subjected to dietetic and medicinal measures for

two months and, during that time, reduced eighteen pounds. Patient begged for operative relief. A mass of fat and skin weighing thirty pounds was removed. He was kept under observation for two months after leaving hospital and lost an additional sixteen pounds. When seen two years later, improvement had maintained itself. It must be stated that patient has since been very careful as to his diet.

CASE 5.—Female; forty-seven years old; four-para; weight 275 pounds. Has had several attacks of acute appendicitis. For last six months more or less constant pain in the appendiceal region. Suffered from the inconvenience and discomfort incident to a fatty, pendulous abdominal wall which, in the erect posture, hung down in a fold which extended to within three inches of the patella. Operation: Removal of a chronically inflamed appendix bound down by adhesions and retrenchment of a mass of fat and skin weighing twenty-eight pounds. Patient was seen eight years after operation and is in good health. She does all her own housework, has no digestive disturbances, and there has been no increase in weight.

CASE 6.—Female; forty-eight years old; six children; weight 290 pounds. Menopause at forty years. Applied for relief from fatty abdominal wall which she said was cumbersome, unsightly, painful, making walking and her household duties difficult and very fatiguing. Excision from the abdominal wall of a slab of fat and skin weighing twenty-nine and one-half pounds. During the first few days after operation patient suffered from pulmonary congestion; otherwise recovery was normal. Discharge of a serous fatty fluid from both angles of wound. Patient left hospital at end of four weeks. Wound was completely healed. She was seen four years later and was well pleased with the results obtained.

CASE 7.—Female; forty-six years old; nullipara. Menopause at forty-one years. Mass in lower right abdominal quadrant. Weight 275 pounds. Laparotomy: removed an ovarian cyst the size of a child's head; also excision of twenty-two pounds of subcutaneous fat and skin. Recovery—left hospital on twenty-second day.

CASE 8.—Male; fifty-three years old. Boss-baker. Hearty eater; heavy drinker. Weight was 315 pounds. During the last few years has had several attacks of biliary colic. Tenderness in right hypochondriac region. Cholecystectomy was done and tubular drainage through right lumbar region for five days. I also removed thirty-five pounds of skin and fat—healing by first intention with exception of two stitch abscesses and collection of clear serum in the region of the left angle of the wound which we squeezed out; otherwise recovery was uneventful. He reported six years later. The pendulous appearance of the abdomen was no longer existent, being replaced by a single transverse abdominal linear cicatrix.

CASE 9.—Female; fifty-two years old; six-para. Menopause at forty-one years. Weight was 265 pounds. Had been treated for last eight years for dyspepsia. Complained much of eczematous condition of skin beneath transverse abdominal fold. I removed a 30-pound slab of fat and skin before opening abdominal cavity. I had intended to do a cholecystectomy. After exposure of the gall bladder, as the patient was taking the anesthetic poorly, I became alarmed and did a cholecystostomy. I removed over four hundred small biliary calculi. Patient left hospital on the twenty-eighth postoperative day. Biliary fistula was still discharging and closed in about a month.

CASE 10.—Female; forty-six years old; nullipara; weight 250 pounds. It was a case of general obesity with pendulous abdomen overhanging upper third of thighs. Patient was much annoyed by her corpulency which abdominal binders and corsets could not conceal and had failed to relieve. Physical condition was good. I re-

moved a mass of fat and skin weighing twenty-eight pounds. Patient complained of distressing tightness in the abdomen which completely disappeared in a few days.

CASE 11.—Female cook; forty-nine years old; nullipara; weight 272 pounds; menopause at forty-two years. Pendulous fatty abdomen was such a physical handicap that patient had to abandon her position. She was mentally depressed by her infirmity. I removed thirty-seven pounds of skin and fat. Patient was seen three months after operation. She was happy and back at work.

SUMMARY

In suitably selected cases, the operative removal from the abdominal wall of large wedge-shaped masses of subcutaneous fat has the following advantages:

1. It is a safe and invariably beneficial surgical procedure. It has always been performed under general surgical anesthesia; never under local or spinal anesthesia.

2. It is always devoid of immediate or remote dangers to the patient; though the wound be extensive, the hemorrhage is moderate and healing is good.

3. It is simple of execution, and, if unassociated with another operative procedure, the technic is easy and the performance of the operation does not consume much time. It is all important that the incisions be carried to but not beyond the fascia.

4. It may be the only operation indicated and performed in the case at hand.

5. It is, at times, called for as a preliminary operative step to facilitate intraabdominal work and to give better access to intraabdominal organs.

6. It is not infrequently employed in conjunction with other operations. The operator retrenches an unwieldy, useless, pendent mass of subcutaneous abdominal fat and at the same sitting brings relief to, or corrects, coexisting pathologic abdominal conditions.

7. It eliminates a physical handicap, effects a marked improvement in the patient's appearance and general well-being and procures complete relief from an unsightly, painful and disabling deformity.[23]

8. It gives permanent results,[17] if postoperative instructions regarding diet and exercise are followed. Adipose tissue, when excised, never fully regenerates.

9. It secures the following benefits:

(a) Diminution in weight. "At time of patient's departure from the hospital, she weighed seventy-five pounds less than at time of entrance."[5] "On discharge, the loss in weight was about ninety-three pounds."[9]

(b) Freedom from discomfort, local and general, and from the disability incident to cumbersome, burdensome, pendulous fatty abdomen.[12, 22]

(c) Improvement in the patient's general appearance, the hippopotomic abdominal wall being converted into a straight front. Improvement in pose; body is no longer awkwardly balanced and gait ceased to be waddling. Patient is enabled to resume his or her occupation.

(d) Patient, after its performance, can occupy a more normal, more natural and more useful relation to society.

(e) The patient can be more active, can give better personal attention to the body, can give his or her work the necessary attention and necessary application.[7]

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Selected Abstracts

Congenital Malformations

Polano: True Hermaphroditism in the Human Being. Zeitschrift für Geburtshülfe und Gynäkologie, 1920, lxxxiii, 114.

Polano gives a very detailed clinical and pathologic description of a case of this very rare anomaly. The patient, a tailor of twenty-two years, considered himself a male but showed feminine secondary sexual characteristics in mental attributes, voice, hair distribution, bony skeleton and well developed mammae. At the age of three he had undergone a series of plastic operations for what was considered a third degree hypospadias. Patient's habits of life were masculine but he showed no sexual inclinations toward either sex. At twenty, regular and painless but scanty monthly bleeding appeared from the urethra. Patient appeared for operation because of an abdominal tumor which proved to be malignant, arising from the right ovary, of the type of an epithelioma chorioectodermale. There was a small but well developed uterus, normal left tube and parovarium. The left ovary showed small cystic degeneration, with primordial follicles and corpora albicantia, with theca lutein cells. In its center was testicular tissue with Sertoli's cells but without evidence of spermatogenesis. There was also a circumscribed metastasis from the tumor of the other side. The right tube was atretic, and only isthmic portion well developed; wolffian body remained in mesosalpinx abnormally well developed, giving picture of the vas deferens. The vagina opened into the operatively constructed urethra, just behind the hypertrophied penis-like clitoris. The author gives a critical review of the literature consisting of three authentic cases in men and seven in animals.

Margaret Schulze.

Villette: Congenital Absence of the Vagina and Formation of a Vagina by Intestinal Transplantation. Archives Franco-Belges de Chirurgie, 1923, xxvi, 1047.

The earliest attempts at formation of a new vagina consisted in reduplication of the perineal tissues between the bladder and rectum. Other operations attempted to remedy the condition by using the peritoneum of the culdesac. The use of vaginal mucous membrane removed from some other case such as a procidentia has also been suggested. However the results from any of these operations were not satisfactory. Villette, in reviewing the literature was able to find thirty-three cases where a loop of small intestine was used satisfactorily in the formation of a new vagina. He therefore concludes that this is the operation of choice.

An unmarried woman, twenty years of age, consulted the author because she desired to become married. General examination revealed no abnormality. Vaginal examination showed a complete absence of the vagina. Later when the abdomen was opened the ovaries were found to be normal except for a small cyst on the right ovary. The tubes also were well developed. The proximal ends of the tubes were attached on either side to a cord-like structure which was a rudimentary bicornate uterus. These cord-like structures united at their lower end to form a rudimentary cervix, and were attached firmly to the posterior surface of the bladder.

The operation was done in three steps. At the first an opening was made in the rectovaginal septum. This opening extended from the vulva to the peritoneum of the culdesac. At the second operation, the abdomen was opened and a loop of small intestine about twenty cm. in length was isolated with its v-shaped mesenteric attachment. The continuity of the small bowel was restored by a lateral anastomosis. The isolated loop was placed through the peritoneum of the culdesac into the opening made previously. The tissues of the culdesac were then closed over and the abdomen closed. Finally, the third step consisted in bringing down one end of the intestinal loop from below and suturing it to the perineal surface.

The wound healed nicely and the patient was discharged on the eighteenth day. She was seen six weeks later at which time two fingers could be introduced into the artificial vagina with ease. THEODORE W. ADAMS.

Hortolomei: Four Cases of Congenital Absence of the Vagina. Zentralblatt für Chirurgie, 1923, l, 259.

The four cases here reported were operated on by the Baldwin method in which the vagina is constructed from a loop of small intestine. Three operations were quite successful, the resulting vagina being permanent and satisfactory in every way. The fourth patient, however, succumbed to peritonitis.

Including these cases, there have been reported fifty-five cases operated by Baldwin's method with a mortality of twelve or 21.8 per cent. Against this there have been reported forty-eight cases operated on by the method of Schubert, who constructs the vagina from the large intestine, without a single death. Hortolomei, therefore, concludes that, while the vagina made according to Baldwin's method is somewhat more satisfactory and the method presents less technical difficulties, it should be abandoned in favor of Schubert's method on account of the high mortality resulting from the former. R. E. WOBUS.

Hörmann: Construction of Vagina from Intestine in Complete Absence of Former. Muenchener Medizinische Wochenschrift, 1920, lxvii, 1203.

The patient, twenty-five years old, had never menstruated, but was in perfect health otherwise. Examination showed normal vulva, clitoris and urethra with a shallow depression between urethra and posterior commissure.

The operation consisted of three stages: (1) A three cm. incision between the urethra and the posterior commissure, carried through between the bladder and the rectum to the peritoneum; the latter was opened and a gauze tampon inserted. (2) Suprapubic incision. A uterus bicornis unicollis rudimentarius was found with normal ovaries and tubes. Resection was done of small intestine 12 cm. in length, freely adjustable in the transverse axis of the lesser pelvis. Both ends of resected intestine were closed with purse-string sutures. Resected piece was introduced into the artificial vagina after removal of the gauze tampon. Closure of abdominal wound. (3) Opening of the purse-string suture at the distal end of the resected intestine, silk buttonhole sutures between intestine and introitus, forcible stretching.

The wounds healed by first intention. Aftertreatment consisted in speculum dilatation of the introitus.

The patient married and had painless intercourse half a year after operation.

Examination three years after operation showed what one might expect to find in a nullipara who had undergone total extirpation of the uterus.

S. B. SOLHAUG.

Robinson: Congenital Absence of Vagina and Uterus. Surgery, Gynecology and Obstetrics, 1920, xxxi, 55.

Operative measures to create a vaginal tract should be undertaken only in individuals who are physically and psychically women in the fullest sense. In order that the newly constructed vagina should approach the normal as closely as possible it should be lined with a soft, lubricated mucosa and the employment of an intestinal loop for that purpose is the choice operation.

Details of a case operated upon by the method advocated by Baldwin are appended. Robinson, however, prefers to begin his operation from above instead of below, as advocated by Baldwin.

R. E. WOBUS.

Rosenstein: Construction of a Vagina in Cases of Congenital Defect. Monatsschrift für Geburtshilfe und Gynäkologie, 1922, lviii, 176.

Absence of the vagina is usually associated with complete or nearly complete aplasia of the internal genitalia. As an irony of fate, these women are well endowed with all the external sex characteristics and they have the normal libido. While in some cases no trace of a hymen is present, there is often a normal hymen and behind it a very small vagina about one-half to one cm. long. The two symptoms which bring these patients to the physician are amenorrhea and the inability to have sexual intercourse.

It is justifiable, according to the author, to construct a vagina for the women who are, or expect to be, married, since all their happiness may depend upon the presence of a vagina. The best methods of making a vagina are those which utilize the intestine. The small intestine is used in the Baldwin-Mori operation and the large intestine in the Schubert operation. The latter is by far the better since out of forty-seven reported cases there has not been a single fatality, while after forty-nine Baldwin operations there have been ten deaths, a mortality of 20.8 per cent. The Schubert operation is the operation of choice not only because it is not dangerous to life but also because it is extraperitoneal, simpler and can be done at one sitting.

The author reports two cases where operation proved successful using the Schubert technic.

J. P. GREENHILL.

Wharton, Lawrence R.: Congenital Absence of the Uterus and Associated Developmental Defects; Report of a Case. Surgery, Gynecology and Obstetrics, xl, 31, 1925.

The genital and urinary systems have a common origin and in their development are inseparably associated. A clinical study of a case of congenital deformity must be well considered from the viewpoint of the genitourinary system as a whole. Malformations of the uterus are occasionally associated with developmental defects of organs not in the genitourinary system. Such defects have been found most commonly in the abdominal wall, the bony pelvis, and the structures derived from the cloaca, i. e., the rectum, anus and bladder. The experimental work of Hertwig, Sabin and Stockard demonstrates that congenital defects have their incipiency farther back in embryonic life than we have heretofore supposed.

WM. C. HENSKE.

Royster: Malformations of the Uterus: with Clinical Reports. American Journal of Surgery, 1922, xxxvi, 110.

The author cites three very interesting cases of malformation of the uterus, all of which came to hysterectomy. In a survey of the literature he furnishes some theoretical problems that deserve consideration. W. KERWIN.

Nemes: Separated Double Uterus with Hematometra. Wiener Klinische Wochenschrift, 1921, xxxiv, 440.

The author reports a double uterus in which the right cervix opened into a vagina and thence to the outside, while the left one opened into a vagina three mm. wide which ran alongside the right vagina down to a point two inches above the external vaginal orifice where the left opened into the right.

The left uterus was distended with old menstrual blood to the size of a goose egg. The left tube was one-half inch thick and contained no blood. The right uterus was less developed than the left and adherent to its adnexa. There were many pelvic adhesions. A complete hysterectomy was done.

The external genitals were normal except that the introitus was placed somewhat to the right.

The patient was twenty-six years old, had menstruated normally for seven years and then had painful menstruation for one year with cramps in the left side. For the last five weeks the cramps had been continuous. It seems probable that the left vagina became atresic at the time the menstrual pain began and that the blood from the left uterus was forced through the tube into the pelvis, causing pain and the pelvic adhesions. FRANK A. PEMBERTON.

Schoenholz: Congenital Tubal Anomalies. Zeitschrift für Geburtshülfe und Gynäkologie, 1924, lxxxvii, 56.

The author describes cases and gives excellent illustrations which lead him to the following conclusions:

There are anomalies in the tubes of adults whose anatomic structure cannot be explained by an inflammatory process. Cytogenic tissue within the tubal mucosa, infoldings of epithelium into the tubal musculature, as well as the formation of networks by the fimbriae in which there are no histologic signs of a cured inflammation, may in many cases be explained by a disturbance in development. They are to be considered as malformations, and the theory is strengthened by the discovery of isolated examples of similar conditions in tubes of the newborn. The importance of these structures in the tubal nidation of the ovum is obvious. The inflammatory theory of the origin of salpingitis isthmica nodosa and of diverticula should, in view of these observations, be revised. MARGARET SCHULZE.

Krause: A Rare Double Malformation. Zeitschrift für Geburtshülfe und Gynäkologie, 1924, lxxxvii, 92.

The author describes and illustrates a double monster of the type cephaloxiphoomphalopagus, which occurred as a six months' stillbirth. He discusses the etiology of the condition in considerable detail. MARGARET SCHULZE.

Wüsthoff, H.: The Early Diagnosis of Congenital Heart Disease. Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lx, 365.

All the abnormalities in the development of the heart are well tolerated during fetal life and immediately after birth. Only when the placental circulation is ended, do symptoms arise. One of the earliest is dyspnea and this is soon accompanied by cyanosis. The latter symptom may not appear for days or even weeks, or it may occur periodically when the child overexerts itself. The cyanosis is due essentially to a venous stasis, therefore insufficiency of the right side of the heart. With the slowed circulation there is sometimes a marked drop in body temperature. While auscultation in adults is most essential for a correct diagnosis, it is not so important in infants. First because there is great difficulty in localizing the various sounds heard and secondly because in many cases of fetal heart disease no murmurs are heard. Sometimes murmurs are heard only after a few days. Organic murmurs differ from functional ones in that they are loud, rough, are heard all over the cardiac area and in the back and are constant regardless of respiration or posture of the child. Single murmurs are always systolic while a diastolic one is always associated with a systolic one. Percussion is of very little value in infants. The x-ray may help by showing the size and configuration of the heart. Extracardiac symptoms are diminished response to external stimuli, drowsiness, poor nursing and absence of signs of discomfort when wet. Other maldevelopments such as hare lip, cleft palate, epispadias, etc., may help to make the diagnosis. Heredity may play a part. J. P. GREENHILL.

Items

Erratum

In the issue of January, 1925, page 114, line 26, the closing remarks of Dr. Sampson should read "endometrial implants," not decidual implants.

Boylston Medical Prizes of Harvard Medical School

A prize of five hundred dollars and the Boylston Prize Medal is offered every three years for the best dissertation on the results of original research in medicine, the subject to be chosen by the writer. The Boylston Prize Medal will be added to the money prize only in case the winning essay shows special originality in the investigations detailed. In awarding these prizes, preference will be given to dissertations which exhibit original work; if no dissertation is considered worthy of a prize, the award may be withheld.

Dissertations entered for this prize must be in the hands of the Secretary on or before December 31 of the year in which the prize is offered.

The address of the Secretary of the Boylston Medical Committee is Dr. Henry A. Christian, Peter Bent Brigham Hospital, Boston, Mass.

Sofie A. Nordoff-Jung, Cancer Prize

The Commission for the distribution of the Prize for Cancer study founded by Doctor Sofie A. Nordoff-Jung, in agreement with the Foundress, has resolved to distribute the Prize from now on only every two years to the double amount of the sum allotted heretofore, that is One Thousand ($1000) Dollars. The next prize will reach distribution in 1926.

For further information address, Dept. of Biology, Georgetown University, Washington, D. C.

American Congress on Internal Medicine

The Ninth Annual Clinical Session of the American Congress on Internal Medicine will be held in Washington, D. C., March 9-14, 1925.

Practitioners and laboratory workers interested in the progress of scientific, clinical and research medicine are invited to take advantage of the opportunities afforded by this session.

Address enquiries to the Secretary-General, Frank Smithies, 1002 N. Dearborn St., Chicago, Ill.

Books Received

DISEASES OF WOMEN. By Ten Teachers. Under the direction of Comyns Berkeley, Obstetric and Gynecological Surgeon to the Middlesex Hospital, etc. Edited by Comyns Berkeley, H. Russell Andrews, and J. S. Fairbairn. Illustrated. Third Edition. Edward Arnold & Co., London, 1924.

A SHORT PRACTICE OF MIDWIFERY. Embodying the treatment adopted in the Rotunda Hospital, Dublin. By Henry Jellett, Consulting Gynecologist, Rotunda Hospital, etc. etc. Ninth Edition revised. With four colored plates and 263 illustrations. J. and A. Churchill, London, 1924.

PRACTICAL MIDWIFERY. By Gibbon Fitzgibbon, Master, Rotunda Hospital, Dublin. With 175 illustrations. J. and A. Churchill, London, 1923.

ON THE BREAST. By Duncan C. L. Fitzwilliams, Surgeon in charge of out-patients and lecturer on operative surgery to St. Mary's Hospital, etc., etc., London, England. C. V. Mosby Co., St. Louis, 1924.

PROPEDEUTICA OBSTETRICA. Par Arnaldo de Moraes. Docente de clinica obstetrica e assistente da clinica obstetrica da faculdade de medicina do Rio de Janeiro, etc. etc. Illustracoes de Luiz G. Loureiro. Pimenta de Mello & Cia., Rio de Janeiro, 1924.

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KYSTOSKOPISCHER ATLAS. Ein Grundriss fuer Studierende und Aerzte. Von Dr. Erich Wossidlo, Berlin. Dritte Auflage. Mit 53 Abbildungen im Text und 43 farbigen Tafeln mit Tafelerklaerungen. Verlag von Wilhelm Engelmann. Leipzig. 1924.

DAS PNEUMOPERITONEUM IN DER GYNAEKOLOGIE. Von Dr. Hermann Wintz, Professor und Direktor der Universitaets-Frauenklinik in Erlangen, und Dr. Rudolf Dyroff, I. Assistent der Frauenklinik Erlangen. Mit 5 Abbildungen und 51 Lichtdrucktafeln. Verlag von Georg Thieme, Leipzig, 1924.

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NOTES ON PATHOLOGICAL AND OPERATIVE OBSTETRICS. By Lyle G. McNeile, Professor of Clinical Obstetrics, College of Medical Evangelists, Los Angeles; Senior Attending Obstetrician, Los Angeles County Hospital, etc. Lefax, Incorporated, Publishers. Philadelphia, 1924.

COMMON INFECTIONS OF THE FEMALE URETHRA AND CERVIX. By Frank Kidd, and A. Malcolm Simpson, with additional chapters by George T. Western and M. S. Mayou. Oxford University Press, London, etc., 1924.

DIAGNOSE UND THERAPIE DER GENITAL TUBERKULOSE. Von Professor Dr. O. Pankow, Duesseldorf. Wuerzburger Abhandlungen. Neue Folge, Bd. 1. H. 2. Verlag von Curt Kabitzsch. Leipzig, 1923.

ZUR PATHOLOGIE UND KLINIK DER OVARIALTUMOREN. Von Dr. E. Stuebler und Dr. Th. Brandess, Assistenzaerzte der Universitaets-Frauenklinik in Tuebingen. Verlag von Curt Kabitzsch. Leipzig, 1924.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE OF THE UNITED STATES. For the fiscal year 1924. Government Printing Office, Washington, 1924.

ANATOMY OF THE HUMAN BODY. By Henry Gray. Twenty-first edition, thoroughly revised and re-edited by Warren H. Lewis, Professor of physiological anatomy, Johns Hopkins University, Baltimore. Illustrated with 1283 engravings. Lea & Febiger, Philadelphia, 1924.

PRATIQUE DE L'ALIMENTATION ET DE L'HYGIENE DU NOURISSON. Par Mme P. Greyfie de Bellecombe. A. Maloine & Fils, Editeurs, Paris, 1924.

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